

THE
WONDERS OF THE WORLD
IN
NATURE AND ART.

DESCRIBED ACCORDING TO THE LATEST AUTHORITIES
AND
PROFUSELY ILLUSTRATED

BY
G. C. MUKERJEE,

AUTHOR OF
*Petitioners' Guide, Students' Guide to English
Grammar and Composition, &c. &c.*

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PREFACE

—O—

The present volume needs only a few words of explanation by way of introduction.

In the following pages will be found a concise description of some of those objects in nature and art, which excite our admiration and rouse our interest and curiosity. These essays were originally written independently of each other. Subsequently, however, at the request of friends, it was decided to arrange them in the form of book and present them to the public in their present shape.

In a certain sense all objects in nature and art must be romantic when the student is not content with mere external details but tries to see below the surface. Every natural object or phenomenon if carefully studied with regard to its purpose and its bearing, must as a matter of course infuse in the mind of the observer a sense of awe for its Maker and a deep veneration for the design that underlies it and so too do the productions of art that one sees around and it serves not only as a means of enjoyment but also of profit to reflect on the various stages through which they have passed in arriving at their present state of perfection.

There are some objects and phenomena however,—not very few in number—which never fail to excite the

of all persons who may care to view or think of them, no matter how cursorily. It is only those that are meant to be dealt with in these pages; and they are described not indeed with the pen of a writer adept in the art of such descriptions. A simple matter of fact description is all that has been aimed at while the reflection and imagination are left to my gentle readers. It is however hoped that although the element of romance is not brought ostentatiously forward in any of these essays, the reader will find it abundantly illustrated in all the chapters, which are comprised within the present volume.

In conclusion, I offer my most sincere thanks to those great minds and intellects to whose power of observation and description posterity is indebted for almost the whole of their knowledge in this direction, and to them shall always remain due the debt of immense gratitude of the *Wonders of the World* and its

Author

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Water Spouts
Geysers or Thermal Springs
Meteors and Shooting Stars
Fata Morgana.
The Spectre of the Brielon
The Aurora Borealis



WONDERS OF THE WORLD

PART I.

LAND.





The Wonderful Tocci Twins.

Here is an illustration of what are probably the most remarkable human twins that have ever approached maturity. They are known as the brothers Giovanni and Giacomo Tocci. They were born on July 4, 1875, their mother being nineteen years old. The mother's maiden name was Antonia Mezzano. Their birthplace was Locana, Turin (Italy). The same mother has had nine children, all strong and well.

The twins are connected from the sixth rib downward, and have but one pair of legs and a single abdomen. The spinal columns are distinct until the lumbar region is reached. There they unite at an angle of 130 degrees. The sacrum seems to be a single bone. They have two distinct stomachs, hearts, and pairs of lungs. The arterial and respiratory systems are quite distinct. The heart beats and breathing differing often in the two individuals. At the age of thirty days

, weighed eight pounds, and in the next thirty one days gained nearly three pounds

Their lives are distinct They have regions of common sensibility, and of purely individual sensation One often sleeps when the other wakes There is no direct correspondence of their appetites One may be hungry while the other is fast asleep

In their general appearance there is nothing repulsive They have bright intelligent face, not of the peculiar cast common to cripples They are educated and write their names as *soulen rs* for visitors

They are able to stand but have not yet succeeded in walking as each leg is governed by its own brain The want of correspondence has proved fatal to all attempts in this direction They can stand quietly so that it is not only question of strength At their home they spend much of their time on the floor using their inner arms for the most part crawling and tumbling about and thus getting a certain amount of exercise They can dress and undress themselves

They are disconnected as regards illness Quite recently one of them had a cold while the other was suffering from a bilious attack

A wonderful Pair.

About seven years ago in the metropolis of the Indian Empire there was brought for show a pair of boys about a month old, who may properly find a



FIG 2

A WONDERFUL PAIR

mention in this book of wonders. They were born of a woman, Ooriya by caste, and had features just as those of ordinary Ooriya boys. They were kept lying on a *cot*, facing each other, and that perhaps was the only position in which they could remain, for they had their bodies joined to each other for some part just above the abdomen. The movement of their muscles was perfect and independent, and the only peculiarity observable in them was that their respiration was simultaneous, in fact both of them inhaled and exhaled together.

The parents made a good round sum by the exhibition of their offspring, and after a short time, shifted away, leaving no trace of their subsequent whereabouts, and it is not known what afterwards became of this wonderful pair.

In Fig 2, are shown the two sisters, Rosahna and Maria, who have just been discovered in Brazil. These two girls are ten years of age and were born at Cachaeiro de Itapemerim.

The Russian Youth.

The Fig 3, represents a Russian, whose peculiar features have gained for him a world-wide notoriety. His name is Yoja, and the figure shows him at the age of twenty-six. His face bears a strong resemblance to that of a mastiff, being covered all over to the neck



FIG. 3 THE RUSSIAN YOUTH

shaggy and reddish yellow hairs. The hair on head, however, is deep black. He thinks and moves just as men, but has propensities somewhat doggish. If his head be kept hidden, you can have no idea of the extraordinary head he carries on his shoulders, while if his head be the only part exposed to your view, you are sure to mistake him for a huge mastiff ready to spring upon you.

The Bearded Lady.

The Fig. 4, represents Mdme Jones, the French woman with beard and moustache. Her slender features, and bright complexion give her the appearance of a woman to all intents and purposes, excepting that she has a long beard and a pair of moustache as big as you can fairly desire to have while going abroad. She always carries with her a black handkerchief of rather unusual size, with which she wraps her chin and mouth up to the tip of the nose, feigning a tooth-ache which she never expects to get rid of.

In Fig. 5, is shown a Punjabee woman who was born in Kunjpura, in the Punjab in the year 1865. She was married and had children. Her beard and moustache were longer and thicker than those generally met with in a man.



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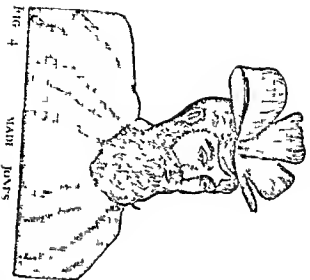


FIG 5 11 VAIRI WOVAN

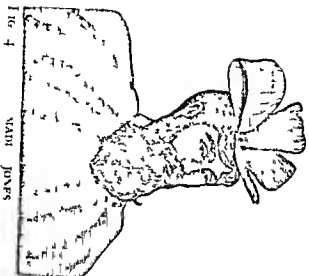


FIG. 4. MARI JONES



FIG. 5. P. V. J. H. F. NOYAN

Carnivorous Plants.

Carnivorous or what are sometimes called insectivorous plants are a physiological assemblage belonging to a number of distinct natural orders. They agree in the extraordinary habit of adding to the supplies of nitrogenous material afforded them in common with other plants by the soil and atmosphere, by the capture and consumption of insects and other small animals. The curious mechanical arrangements which lie at the bottom of this interesting phenomenon can not be understood without a detailed examination, too complicated for an elementary treatise like this.

Insects seem to be attracted by the leaves of these plants, but whether by their colour, their glittering secretion, their odour or by all three, remains as yet unsettled. A fly, alighting on the disk or even only touching one or two of the exterior tentacles, is immediately entangled by a viscid secretion, which is instantaneously discharged; the tentacles to which it is adhering begin to bend, and thus pass on their prey to the tentacles next succeeding them inwards, and the insect is thus carried by a curious rolling movement to the centre of the leaf. The tentacles on all sides become similarly inflected; the blade or the leaf may even become almost cup-shaped, and the insect bathed in the abundant secretion, is drowned in about a quarter of an hour. The leaves clasp also, but for a much shorter time, over inorganic bodies

find that the water that at first accumulates in the bottom of the tree and afterwards flows in different directions by various channels, comes not out of the over hanging cloud, but is the result of perspiration of the tree. It has been ascertained after careful observation that "each tree secretes at least 20,000 tons of water at night. This species of trees was found scattered over the island, and the water yielded by them would supply the wants of the islanders and the beasts, living in an area whose circumference was 150 miles. Mr Jackson concludes the description by writing, "I would not have believed in the existence of this wonderful tree had I not seen it with my own eyes

Wonders of Vegetation

The accompanying sketch represents two of the most remarkable vegetable oddities which have been noticed, and it will be seen from the account given here that the representations are not exaggerated.

The turnip with the human face, represented in Fig 6, grew in 1628, in a garden at the village of Weidan, between Bonn and Juhers in Germany. It will be observed that the leaves resembled bristling hairs or feathers such as ladies wear when attired in court costume. On the round part of the root there were marks resembling eyes, nose, and mouth. A very slight stretch of imagination will convert the entwined roots into arms and legs, and the whole will then bear a very close resemblance to a female figure adorned with head dress, sitting cross legged, with her arms folded.

The root of the parsnip shown in our engraving, Fig 7, represented the back of a hand so perfectly that it could not be surpassed by the best painter. This wonderful parsnip had been shown at the museum of Birmingham city in the year 1807.

Natural Bridge in Virginia.

This famous bridge is on the head of a fine limestone hill, which has the appearance of having been rent asunder by some terrible convulsion in nature. The

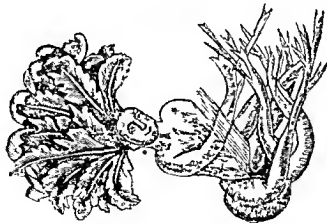


FIG. 6 THE TURNIP

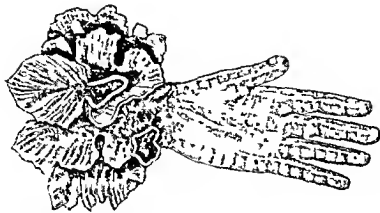


FIG. 7 THE PARSNIP

fracture thus made is about ninety feet ; and over it the bridge runs, so needful to the spot, and so unlikely to have survived the great fracture, as to seem the work of man ; so simple, so grand, so great, as to assure you that it is only the work of God. The span of the arch runs from forty-five to sixty feet wide, and its height, to the underline, is about two hundred feet, and to the head, about two hundred and forty. The form of the arch approaches to the elliptical, and it is carried over on a diagonal line, the very line of all others so difficult to the architect to realize, and yet so calculated to enhance the picturesque beauty of the object.

There are chiefly three points of sight. You naturally make your way to the head of the bridge first, and as it is a continuation of the common road, with its sides covered with fine shrubs and trees, you may be on it before you are aware. But the moment you approach through the foliage to the side, you are filled with apprehension. It has, indeed, a natural parapet, but few persons can stand forward and look over. You instinctively seek to reduce your height, that you may gaze on what you admire with security. Even then it agitates you with dizzy sensations.

You then make your way about fifty feet down the bosom of the hill, and are supplied with some admirable standings on the projecting rock-work, to see the bridge and all its rich accompaniments. There is, two hundred feet below you, the Cedar River, apparently motionless, except where it flashes with light as it cuts its way through the broken rocks. Mark the trees of every

variety, especially the firs, how they diminish as they stand on the margin of its bed, and how they ascend, step by step, on the noble rock-work, till they overshadow you, still preserving such delicacy of form and growth, as if they would not do any injury, while they lend a grace. Observe those hills, gathering all around you in their fairest forms and richest verdure, as if to do honour to a scene of surpassing excellence. Now look at the bridge itself, springing from this bed of verdant loveliness,—distinct, one, and complete! It is before you in its most picturesque form. You just see through the arch and the internal face of the farther pier is perfectly revealed. Did you ever see such a pier—such an arch? Is it not most illusive? Look at that masonry. Is it not most like the perfection of art? and yet what art could never reach. Look at that colouring. Does it not appear like the painter's highest skill, and yet unspeakably transcends it?

This is exquisite. Still you have no just conception of this master-piece until you get below. You go some little distance for this purpose, as in the vicinity of the bridge the rocks are far too precipitous. A hot and brilliant day is, of all others, the time to enjoy this object. To escape from a sun which scorches you into these verdant and cool bottoms, is a luxury in itself, which disposes you to relish everything else. When down, I was very careful of the first impression, and did not venture to look steadily on the objects about me till I had selected my station. At length I placed myself about one hundred feet from the bridge, on some

masses of rock, which were washed by the running waters, and ornamented by the slender trees, which were springing from their fissures. At my feet was the soothing melody of the rippling gushing waters. Behind me, and in the distance, the river and the hills were expanding themselves to the light and splendour of day. Before me, and all around, everything was reposing in the most delightful shade, set off by the streaming rays of the sun, which shot across the head of the picture far above you, and sweetened the solitude below. On the right and left, the majestic rocks arose, with the decision of a wall but without its uniformity, massive, broken, beautiful, and supplying a most admirable foreground, and everywhere the most delicate stems were planted in their crevices, and waving their heads in the soft breeze, which occasionally came over them. The eye now ran through the bridge, and was gratified with a lovely vista. The blue mountains stood out in the background, beneath them, the hills and woods gathered together, so as to enclose the dell below, while the river, which was coursing away from them, seemed to have its well head hidden in their recesses. Then there is the arch, distinct from every thing, and above every thing! Massive as it is, it is light and beautiful by its height, and the fine trees on its summit seem now only like a garland of evergreens, and elevated as it is, its apparent elevation is wonderfully increased by the narrowness of its piers, and by its outline being drawn on the blue sky, which appears beneath and above it! Oh, it is sublime; so

and yet so elegant; springing from earth, and bathing its head in heaven! But it is the sublime, not allied to the terrific, as at Niagara; it is the sublime associated with the pleasing. I sat and gazed in wonder and astonishment. That afternoon was the shortest I ever remember. I had quickly, too quickly, to leave the spot for ever; but the music of these waters, the luxury of those shades, the form and colour of those rocks, and that arch rising over all, and seeming to offer a passage to the skies. Oh, they will never leave me?— *Dr. Reed.*

Sand Pillars in the Desert.

It is a known fact that when the movement of the atmospheric current has attained a certain degree of speed, the wind becomes a storm wind. Whirlwinds, dust storms, sand storms, and tornadoes are essentially the same, differing from each other only in their dimensions and in their intensity. Of these, whirlwinds occur where for the time the air is unusually warm or moist, and where consequently temperature and humidity diminish with the height at an unusually rapid rate.

The simplest form of the whirlwind is that observed on calm days, on large squares or cross roads when sand and leaves are lifted and whirled round for a few seconds. Dust whirlwinds of considerable size are sometimes observed in the steppes of Russia, but the best known



FIG. 8.

SAND PILLARS IN THE DESERT.

phenomena of this kind are the high sand pillars of Sahara, and we shall content ourselves with a short description of that wonderful phenomenon.

Previous to the outbreak of the sand-storm the air is unusually calm and sultry, just as happens in the case of the tornado. But the state of the wind has not been clearly connected with the occurrence of this phenomenon. Gradually however huge columns of sand turn up,—columns of various diameters and heights, some of them rising to 6,000 feet or so. These tall aerial columns of sand move onwards and drawing into themselves, as they whirl round in their course, dust and other light bodies within the sweep of the strong air currents which blow along the surface of the ground and converge towards the base of the pillars. These pillars whirl round about their own axes independently of each other, with currents of air at the base curving inwards and ascending upwards as may be seen from the movement of the solid particles which whirl up with them in their ascending course.

The sand storm is the thing to be feared on the desert. The gigantic columns twisted up in the manner described above are propelled onwards in the direction of the storm. Nothing can check their course, they hurry onwards,—carrying in their impetuous course men and camels and merchandise, sweeping away, as if by a brush all that lie in their way, and sometimes burying alive whole bodies of caravans. The ship of the desert at first speeds headlong to avoid being overtaken by these harbingers of death, but unable to cope with it any

longer, he dives his head deep in the sandy plain below, and meekly tenders himself to the mercy of the elements. Men, thus left helpless with these huge pillars beating against them experience a sensation which can be better imagined than described. Their pulsation becomes quick, breathing increases in rapidity and hardness, thirst of the most terrible kind ensues, great exhaustion is felt, courage sinks and at last not unfrequently does suffocation close up their dreadful agony.

A Volcano.

Volcanoes are mountains generally conical in shape, which emit smoke and flame, and often throw out showers of ashes, stones, and melted rock or lava all over the surrounding country. They are sometimes isolated but often occur in chains such as the Andes.

It is difficult to state with certainty the number of volcanoes at present in action on the one hand because many a cone which has for a long time been classed among extinct volcanoes suddenly awakens into action, and proves that it has only been lying dormant and also because we do not yet know all the existing volcanoes. There are at present 672 volcanoes in the world of which 263 are active ones. They are thus distributed: Eleven are in Iceland and Jan Mayen, ninety three in Asia, twenty six in Africa, forty six in North America and the Aleutian Islands, twenty-

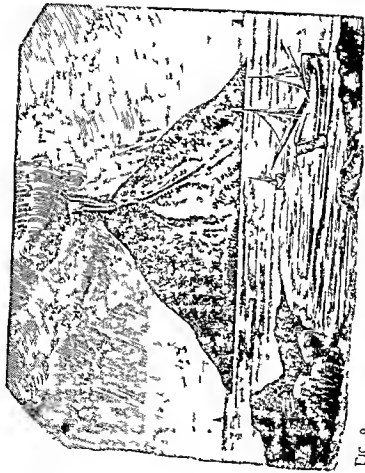


Fig. 9

AVICOLA

in proportion to the amount ejected from the crater. After repeated eruptions of the streams of liquid fire welled upward from the centre of the earth a conical mound is formed with alternate layers of lava and ashes which fill radiating from the vent on all sides. Later research however has disproved this theory and arguments of various kinds go the length of showing that all volcanoes have not obeyed the law thus laid down.

Observations made in mines and caverns in all climates show that even at what may be considered a very small depth the temperature of the earth is much above the mean temperature of the atmosphere at the surface. The depth at which the globe may be regarded as a molten mass has been calculated. All volcanic phenomena are probably the result of a communication either permanent or transient between the interior and exterior of the globe. Elastic vapours press the molten substances upwards through deep fissures and thus volcanoes may be termed intermitting springs or fountains of earthy substances—that is of the red hot fluid mixture of metals alkalis and earth which constitute lava currents and flow softly and tranquilly, and gradually solidify when they find a passage by which to escape.

Volcanoes differ in the frequency of their eruptions and the same volcano is generally very unequal in its periods of activity and quiescence. Periods of inactivity extend to any time and at Ischia an interval of seven teen centuries between two successive eruptions is recorded. Some volcanoes continue almost incessantly

in action The most active of all known volcanoes is Sangay south east of Quito which has been in eruption ever since 1728 The rapidity of its explosions some times causes a continuous roar which is loud enough to be heard for over three hundred miles

Earthquakes.

Of all the terrible displays of physical action which occur from time to time in the economy of our planet, striking the inhabitants with terror or overwhelming them with instant destruction the most instantaneous the most dreadful and the most extensive and disastrous in its consequences—is unquestionably an earthquake The atmospheric displays of thunder and lightning amid congregated clouds and down pouring deluges of rain are often awfully sublime in themselves striking every animal with terror and making man feel as if he were really nothing and the stroke of the lightning at times shatters the habitations of men and instantly puts an end to life But sublimed as those displays are and sudden and fatal as often are their effects there is yet more of the majesty of display than of the reality of danger in them even in those regions and at those times when they are most fearful and most frequent

Volcanos during their active periods are more alarming as well as more destructive than the atmospheric displays of lightning and thunder and man has

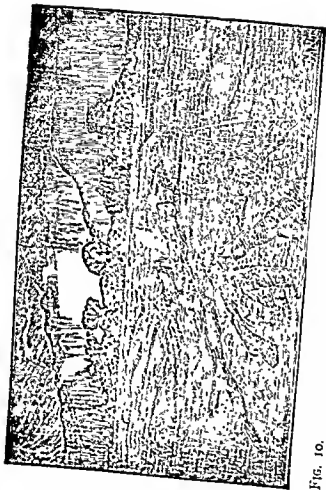


FIG. 10.

L ARTHQUAKF.

similarity in them, and their difference is more marked in what may be called their field of action, that is to say in their intensity, and extent, which vary directly in proportion to the resistance which the field or medium is capable of offering to the active energy. The lightning is in the atmosphere and the extreme sensibility of that fluid to expansion by heat prevents the action from being brought up to the same powerful and protracted extent as it is in the case of the volcano, in which the resistance of the volume of the mountain in its weight and its cohesion renders the action far greater, and of much longer duration, and as that matter which escapes has no more action, except by its remaining heat, the mountain only is affected. And if the matter discharged by the eruption flows freely, the mass of the mountain is not extremely agitated neither is the surrounding surface disturbed in any other way than by the substances that may happen to be cast upon it.

But though these are majestic and often terrible displays neither of them can be regarded as an embodiment of general and final ruin. In the thunder storm we have the earth perfectly safe, excepting the little part which the lightning immediately strikes and the stroke is over in an instant and not again repeated. The eruption too is confined to its mountain, the summit of which is far above the level of human habitation as if it had been raised there to place it where it had the least chance of doing mischief, and therefore the alarm is local. The chief advantage the main feeling

of safety, however, in the case of these is, that the progress is open to observation, and can be understood, which will always moderate the effect of terrific objects and phenomena, whatever they may be

It is very different with the earthquake, for there, the foundations of our stability on earth are shaken, and shaken in an instant without the slightest warning. Even when the shock is so very slight that it does not injure or displace any object whatsoever, there is an indescribable feeling in it which alarms us far more than the most violent displays of such action as does not affect the electricity of the earth

What the specific action or cause of action may be that produces an earthquake we cannot, of course tell, but that it must be action of some kind or other, by which great heat, commotion and probably the formation of gases are occasioned we have no reason to doubt, for we know of nothing that can disturb the matter of the earth itself, at any considerable depth below the surface except the action of one material substance upon another

Many theories have been propounded as to their origin. M. Perry, a French savant is of opinion that the lunar and solar attractions which produce on the surface of the globe the flux and reflux of the seas, act in the same manner on the fluid mass contained in the interior of the earth, and to the potent influence of the moon he refers those convulsions called earthquakes. From long observation, he concludes they

are more frequent at the syzygies than when the moon is in or near perigee.

Mr. Mallet, in an elaborate report presented to the British Association, assumes that the centres of earthquake disturbance are near the sea or other great supplies of water. When an upheaval of igneous matter takes place from the centre of the earth, opening up a communication directly with the sea, on meeting with the intensely heated lava, the water assumes the spheroidal state. While in this condition, the intestine motion may be great, but little steam is generated, and no further impulses will be conveyed to a distance except only the tremblings which precede the shock. No sooner, however, have the surfaces cooled than the water comes into close contact with them, and a vast volume of steam is evolved explosively, and blown off into the deep and cold water of the sea, where it is condensed and thus a blow of the most tremendous sort is given at the volcanic focus, and being transferred outwardly in all directions, is transmitted as the earthquake shock.

Mrs. Somerville, in her work on Physical Geography, is of opinion that they are produced by fractures, sudden heavings, and subsidence in the elastic crust of the globe,—these fractures and subsidences being due to the pressure of the liquid fiery nucleus of the earth's centre, and affording to its gases and vapours a number of needful vents. The tension acquired by the strata during their slow refrigeration is thus relieved, and an equilibrium restored. The shock,

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underwent so tremendous a shock that they seemed to approach and retire with a most dreadful noise. At the same time, and in the middle of the day, they cast forth fire and smoke, to the dismay of the astonished spectator. By this shock several towns were destroyed, and all the animals in their vicinity killed. During the reign of Iriyan the city of Antioch was, together with a great part of the adjacent country, destroyed by an earthquake, and about 300 years after, during the reign of Justinian, it was again destroyed, with the loss of 40,000 of its inhabitants. Lastly, after an interval of sixty years that ill-fated city was a third time overwhelmed with a loss of 60,000 souls.

The earthquake which happened at Rhodes upwards of 200 years before the Christian era, threw down the famous Colossus together with the arsenal and a great part of the walls of the city.

In the year 1182, the greater part of the cities of Syria and of the Kingdom of Jerusalem were destroyed by a similar catastrophe, and in 1594 the Italian writers describe an earthquake at Puteoli, which occasioned the sea to retire 200 yards from its former bed.

In 1693, a great earthquake visited Calabria. For the space of 200 miles the remains of ruined towns and villages were everywhere to be seen, and the inhabitants without dwellings, were dispersed over the fields. In this earthquake 100,000 persons perished.

In 1747, a great earthquake overtook the town of

Callao, in which all the inhabitants were destroyed save one. The man who escaped was standing on a fort which overlooked the harbour. He saw the sea retire to a distance, and then return like a vast mountain in height. He heard a cry of *miserere* rise from all parts of the city, and in a moment all was silent. Where the town had once flourished there was a wide sea. But the same wave which overwhelmed the town drove past him a small boat, into which he flung himself, and so was saved.

An earthquake at Messina, in Sicily, 1783, was felt over an area of five hundred square miles. Many and sudden sinkings of the land were perceived, numerous fissures were formed, and partial elevations effected in some places; and a fissure a mile in length, one hundred and five feet in width, and thirty feet in depth, opened at Plaisteduo. Another about the same length, and a hundred feet deep, was found at Cerzulle. At La Fortuna, a chasm a quarter of a mile in length, thirty feet in width, and 225 feet in depth suddenly opened in the ground. Along the Straits of Messina, the cliff of Gidro Greco, a mile in length, was precipitated on the subjacent houses and gardens. A fragment detached by the earthquake from Monte Jaci, crushed multitudes who had fled to the shore for safety; and at the same moment a wave broke on the shore, and swept away the aged *Prince of Scylla*, and numbers of his people.

The Grotto of Antiparos.

Antiparos is a small island in the Archipelago, sixteen miles in circumference, and about one mile east of Paros. The Cyclades are clusters of islands situated on the north of Candia, and east of the celebrated city of Athens, amongst which are the islands of Scyros, where Achilles, Homer's hero, passed his infancy, Delos, celebrated for the birth of Diana and Apollo, for its palm-trees and festivals, and Navos, noted for some of the events which happened to Aridne, Theseus, and Bacchus.

The most remarkable natural object in these islands is the celebrated Grotto or Cavern of Antiparos, which is of great extent and beauty, and is supposed to have been known from a remote period of antiquity, for there are two inscriptions on natural pillars near the entrance, bearing the names of several individuals celebrated in Grecian history, and there exists a tradition among the inhabitants of the island, that Antipater and others, who conspired against Alexander the Great, took refuge in this cave for fear of being pursued, after their designs had been counteracted, which occurrence must have taken place about 2230 years ago. For nearly two thousand years all knowledge of the grotto was lost, as it was not till the seventeenth century that any person was known to enter it, whether this arose through terror arising from superstition, or was caused by ignorance of the existence of the cavern, is not exactly known, but whichever it was, an Italian traveller named Magni was the first person in modern times who undertook the

arduous task of exploring this dark and dismal spot, of which he gives the following account.

"Having been informed," says Magni, "that in the island of Aotiparos a gigantic statue was to be seen at the mouth of a cavern, we (the French consul and himself) resolved to pay it a visit, accordingly we landed on the island, and walked about four miles over some beautiful plains and woodlands till we came to a little hill, on the side of which yawned a hideous cavern, whose terrific gloom almost repressed our curiosity, after a moment's pause, however, we entered, and had not proceeded above twenty paces, when we perceived that the supposed statue of a giant was in reality nothing more than a sparry concretion, formed by water dropping from the roof of the cave, and gradually hardening into a figure, which the fears of the country people had transformed into a monster (the calcareous depositions formed on the roofs of caverns are called in scientific language stalactites, whereas stalagmites are incrustations formed on the floors of caverns). Incited by this extraordinary appearance, we determined to penetrate further in quest of new adventures, and, as we proceeded, new wonders presented themselves to our contemplation the spars, formed into a variety of trees and shrubs, exhibited a kind of petrified grove, some white, some green, and all receding in due perspective. Our amazement was much increased by considering that these objects were mere

and were only introduced into the portico of this stupendous temple. In one corner of the half illuminated recess we discovered an opening of three feet wide, which seemed to lead to a place totally dark, and which our guide assured us contained nothing more than a reservoir of water; upon this we threw down several stones, which rumbled along the descent for some time, and at length seemed to fall into a bed of water; but as we were *anxious to gain more satisfactory intelligence*, we prevailed on a Levantine mariner to light a flambeau and explore the narrow aperture. After continuing in it for about one quarter of an hour he returned, holding some beautiful pieces of white spar in his hand, and informing us that the place was full of similar incrustation. We now ventured to follow him for about fifty paces cautiously descending by a steep and dangerous path; but on approaching a precipice which led into a sort of amphitheatre, we returned for a ladder, flambeau, and other things to expedite our descent. We then went down into the most magnificent part of the cavern, and having lighted a number of candles were entertained with a most glittering and interesting scene. The roof was hung with beautiful icicles, transparent as glass, yet solid as marble; the sides were regularly formed with spars, the floor consisted of solid marble, and in several places were representations of magnificent columns, thrones, altars, and other objects, as if nature had designed to mock the richest works of art. Below this spacious grotto, there appeared another cavern, into which I descended about fifty paces by means of a rope, and

at length arrived at a small spot of level ground, where the bottom consisted of a fine soft clay, and easily yielded to my pressure, but here, as in the upper cave, were a variety of beautiful crystallizations, one of which particularly resembled a table. Upon our egress from this stupendous grotto we perceived a Greek inscription upon a rock at the entrance, but the characters were so obliterated by time, that it was utterly impossible to decipher them.

As this is the first modern account of the grotto, and does not contain full particulars of all its wonders, we shall introduce the following, which we consider one of the most graphic descriptions that can be given.

"We," says the author, for the party consisted of a surgeon, the writer, and four other persons, attended by six guides, with lighted torches, 'after two miles march from the coast came to the entrance of the grotto, which is a large low arch, about thirty feet wide, formed of rough craggy rocks overhung with brambles and climbing plants, which give it an air of awful gloominess. After proceeding some twenty yards from its mouth we lost all sight of day light, but the roof and sides of the alley through which we were passing glittered like diamonds by the reflection of our torches.

"At the end of this passage we were presented with ropes to tie about our waists, which, when we had done, our guides led us to the brink of a most terrific precipice. The dreadful depth of this, and the horror of the descent through a miserable darkness, made me look back to the line of diamonds we had just left; but a hope of

seeing something curious at the end of my journey, tempted me to lower myself down by the rope as the guides directed. After reaching the bottom and congratulating our friends on our safe descent I inquired for the grotto, but our guides told us we had a great way to go yet, and they immediately led us forward under a ridge of rugged rocks to the brink of another precipice much deeper and more terrible than the former. Two of the guides now preceded us with torches and by their light we could discern that this passage was not so perpendicular as the other but lay in a steep slant with a very slippery rock for the bottom. vast pieces of rock jutting out on one side in the descent, and forcing the guides sometimes to creep under some times to climb over and at other times to go quite round them whilst a series of dark caverns like so many monstrous wells yawned on the opposite side ready if a man should slip, to swallow him up forever.

"We stood sometimes on the edge to watch the motions of our guides and were equally amazed and terrified to see them descend before us till they seemed at a most frightful depth. On their calling to us from the bottom we began to descend after them but we had not gone 50 feet down when we came to a place where the rock was perfectly perpendicular and a vast cavern seemed ready to swallow us on one side while a wall of rugged rock threatened to crush us on the other. At this terrible prospect I was quite disheartened and declared I would proceed no further, but as the guides assured us there was no danger, and my companions

resolved to see the bottom I proceeded to a corner where was placed an old ladder, and by this we all descended

"Having surmounted this difficulty we found ourselves at the entrance of another passage which, as we slid down appeared to be about 9 feet high and 7 wide and to have for its bottom a green glossy marble. The walls and arched roof being as smooth as if wrought by art, and composed of a glittering red and white granite, supported with red porphyry made a most splendid appearance. When we entered this passage I expected that we should at the bottom be joined by the two guides we had first sent down but alas! when we got there, we found ourselves at the mouth of another precipice, which we descended by a second ladder not much better than the former. The dread of falling employed all my thoughts during this descent, but I observed as my companions were coming down after me that the wall to which the ladder was fastened was a solid of red marble covered with white sprigs of rock-crystal and making with the glow of the purple from behind one immense sheet of amethysts.

'After sliding about 20 feet through another shallow vault of green and white marble and refreshing ourselves with a little rum we proceeded through a slanting passage of rough coarse stone full of figures of snakes rolled, round and seemingly alive, but in reality as cold and as hard as the rest of the stone. When we had walked about 200 yards down this descent we saw two beautiful pillars of a glittering yellow marble which

seemed formed to support the roof, and soon afterwards we descended another precipice, which the guides assured us was the last

"At the bottom of this precipice we found ourselves for some way upon plain even ground, but after walking about 40 yards we entered an alley, the sides and roof of which were entirely composed of black stone, and the rocks were in some places so steep and rugged, that we were obliged to slide down on our backs, and were bruised miserably in passing. Over our heads were nothing but dismal rocks some of which threatened to fall in upon us, and the light of our guides' torches served only to show the surfaces of some dirty lakes of water

"If I had repented of my expedition before, I now gave myself over for lost, bitterly accusing all the travellers who had given such a description of the place as excited people's curiosity, without warning them of the horrors that lay in the way. In the midst of these sad reflections we lost four of our guides, and as the place was now much darker for want of their torches, I expected to follow them into some of those lakes where I supposed they had inevitably perished, although the two remaining guides assured us that we should soon meet their companions again, and that we were very near the end of our journey.

"Our passage now was become extremely narrow and we were obliged to crawl on our hands and knees over the rugged rocks, when in an instant I heard a hissing noise, and found myself in total darkness. The guides

told us they had accidentally dropped their torches in a puddle of water, but exhorted us to crawl forward and told us there was no danger. I was, indeed, astonished at the courage of these men in a place where I thought four of them had already perished but as I thought it impossible for any of us to escape from our situation I determined to lie down and die where I was. One of the guides however immediately came up to me, and clapping his hand firmly over my eyes dragged me a few paces forward. Whilst I was in this strange situation expecting death in a thousand shapes and trembling at the rough behaviour of my conductor he suddenly lifted me over a great stone set me on my feet and removed his hand from my eyes. But what language can express my transport and astonishment at that moment when, instead of darkness and despair all was splendour and magnificence before me, my friends all appeared about me, the place was illuminated by fifty torches, and all the guides welcomed me to the Grotto of Antiparos. I now found that the four men whom I had deemed lost, had given us the slip in order to get the torches lighted before we came, and the other two had wilfully put out their lights that we might enter out of utter darkness into this pavilion of splendour and glory.

"The grotto in which we now were is 120 yards wide 113 long, and about 16 yards high. These dimensions are somewhat different from those which travellers have generally presented to the public, but they are certainly accurate, for I took them with my own hand. Imagine then an immense arch like this, lined with crystallized

white marble, and illuminated by fifty torches, and you will have some idea of the place in which I spent three hours. The roof, which is a fine vaulted arch, is hung all over with icicles of white marble, some of them ten feet long and as thick as a man's wrist, and from these descend a thousand festoons of leaves and flowers of the same substance but so extremely glittering that it is impossible to look upon them without dazzling one's eyes. The sides of the arch seem planted with trees of white marble, rising in rows one above the other, from these are hung beautiful festoons tied as it were from one to the other in prodigious quantities, and in some places there actually seem to be rivers of marble winding in a thousand elegant meanders. All these things have been made in a long course of years by the dropping of water, but they really look like rivers and brooks transformed into marble. The floor was rough and uneven, with red, blue, green, and yellow crystals growing out of it in an irregular manner, these were all shaped like pieces of saltpetre, but so hard that they cut our shoes. And among them are placed icicles or small pillars of white shining marble, to each of which our guides fastened two or three torches. All round the sides of the arch are white masses of marble in the shape of oak trees, and sufficiently large in many places to enclose a piece of ground big enough for a bedchamber. One of these chambers has a beautiful curtain, whiter than satin, of the same marble, stretching entirely over the front, on which we all cut our names and the date of our visit, as many other persons had done before us.

There is scarcely a column in the whole grotto but what has been injured by the indiscreet curiosity of travellers, either for the purpose of examining their internal organization, or of enriching their own cabinets with small fragments of the pillars. But new ones would continually be completed, were the portions which are continually being formed, and which have a direction approaching towards each other, left untouched. In the middle of the great hall, as it is designated there is an immense stalagmite, more than twenty feet in diameter and about twenty four feet in height. This large column has a striking resemblance to an altar, and the beautiful pillars that shoot up round this altar have the appearance of large candlesticks, besides which there are many other natural objects which look like the customary ornaments of a church, so that the whole has a great similitude to the interior of a religious edifice. Indeed, the Marquis of Nomtel who went as ambassador from Louis XIV, of France to the Ottoman Porte in the year 1673, had high mass celebrated in the grotto for the three days of the Christmas festival. About 500 persons attended this interesting and pious ceremony. Men were posted from the extremity to the entrance to communicate the moment, when the host was elevated, to those without, who discharged their fire arms and sounded trumpets and other musical instruments, to render the consecration more impressive. The voices in speaking and singing were increased to a most astonishing loudness through the vaulted roofs, and the firing of the guns was reverberated in such a terrific and awful

manner, that it was almost deafening During the three days and nights, the grotto was illuminated by 100 large torchs of yellow wax and 400 lamps which were kept constantly burning This event the marquis caused to be recorded in an inscription cut on the base of the altar

HIC IPSE CHRISTUS ADFUIT
EJUS NATALI DIE, MEDIA, NOCTE CE
LEBRATO, M MC LXIII

Whether the whole extent of the cavern has been explored is very doubtful but the whole length from the entrance which has been visited is about 1000 feet The inhabitants of the island affirm that it reaches below the sea, and that a goat, having accidentally wandered into it, was found in the isle of Nio, between thirty and forty miles distant, but though this is most probably incorrect, yet there is no doubt that many recesses still remain unentered, and he who does enter further must be a bold traveller indeed, since the cave has such terrific horrors about it

The breadth of the great hall is 300 feet, and the floor at the lowest part is about 254 feet below the surface of the earth — *Edinburgh Encyclopædia Kelly's Geography British Magazine*

The Taj Mehal.

The Taj Mehal is a splendid mausoleum built by the Emperor Shah Jahan over the remains of his favourite wife Mumtaz Mehal, the exalted of the palace, and there he himself was buried

The enclosure, including the gardens and outer court, is a parallelogram of 1,860 feet by 1,000 feet. The outer court, surrounded by arcades and adorned by four gateways forms an oblong, occupying in length the whole breadth of the inclosure, by about 450 feet in depth. The principal gate way, measuring 110 feet by 140, leads from the court to the gardens, which, with their marble canals and fountains and cypress trees, are almost as beautiful as the tomb itself. The tomb stands on a raised platform 18 feet high, faced with white marble, and is exactly 313 feet square. At each corner of this terrace stands a minaret 113 feet high, and of the most exquisite proportions,—more beautiful perhaps than any other in India. In the centre of the marble platform stands the mausoleum, a square of 186 feet with corners cut off to the extent of 33 feet 9 inches. The centre of this is occupied by the principal dome, 58 feet in diameter and 60 feet in height, under which is an inclosure formed by a screen of trellis work of white marbles. Within this stand the two tombs. These, however, as usual in Indian sepulchres are not the true tombs, the bodies rest on the surface of the ground in a vault, beneath plain tombstones placed exactly under those in the halls above. In each angle of the building

A B — Portions of the description of the Taj have been taken from *Glimpses of India*

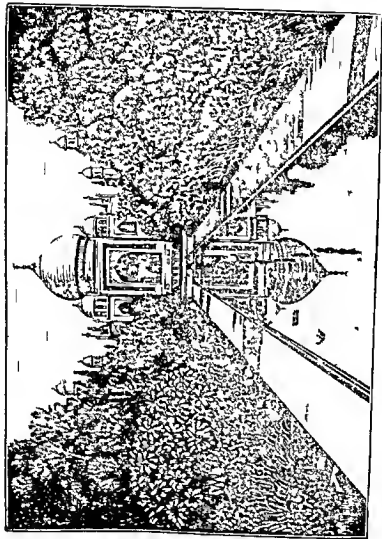


FIG. 11

THE TAJ MEHAL

is a smaller dome of two storey in height, 26 feet 8 inches in diameter and connected by various passages and halls. The light in the central apartment is admitted only through double screens of white marble trellis work of the most exquisite design, one on the outer and one on the inner face of the walls.

The entrance to the Taj is very pretty. Apart from the four kiosks with their Saracenic cusped arches and the slender, graceful, scaly columns tapering above the gates, it cannot escape the visitor's notice that the architect believed in the curious number eleven. Fore and aft there are eleven domelets and eleven spirelets. There are seven different styles of architecture between the lofty arch and the scaly spire, but few are willing to examine the vestibule,—the outer court of the temple,—though it is a magnificent building full of black and white marbles; every one passes on to the door. The Taj is within. The moment the visitor passes through the door he is surprised. Instead of seeing a great building close at hand, whose grandeur strikes him with astonishment, he passes into a long narrow garden walled in by thickly planted trees. The pavement is exquisitely though simply tessellated; the centre of the walk composed of a row of shrubs set in marble reservoirs filled with cool water, and outside the tessellated pavements two rows of cypress trees,—the Semetic emblem of death.

The perspective of the narrow garden is so arranged that the Taj looks a mile away; but as a matter of fact it is not a quarter of a mile distant. If seen by the

moonlight it is a sight never to be forgotten. It is almost as though a dome of pure snow had fallen from heaven and there become crystallized forever. In its dream-like loveliness it seems to belong to another order of things, to a simple, severely chaste world quite different from ours, and if one goes at different times it is the moonlit picture of the Taj which is photographed on the memory.

At the end of the central dark avenue, wide shallow steps lead up to a low terrace of red sandstone about 18 feet high from the four corners of which spring slender minarets. In the centre of this platform is the Taj itself. A great, pure white lofty dome rises between two lesser domes among its attendant minarets to a height of 245 feet from a base which is 186 feet square. The whole of this exquisite building is of purest gleaming white marble and its snowy surface is relieved by beautiful mosaics in carnelian, jasper, agate, lapis lazuli with sculptured vases, flowers and lines of the most exquisite delicate lace-work in marble. It is an early example of the system of inlaying with precious stones which became the great characteristic of the style of the Moghuls after the death of Akbar. These precious stones are combined in wreaths, scrolls and frets as exquisite in design as they are beautiful in colour, and relieved by the pure white marble in which they are inlaid they form the most beautiful and precious style of ornament ever adopted in architecture. The judgment indeed with which this style of ornament is apportioned to the various parts is almost as remarkable as the ornament itself and con-

veys a high idea of the taste and skill of the Indian architects of the age.

No photograph or plan or description can give an adequate idea of the Taj ; partly on account of the flatness of its surfaces which, in the marble original, are relieved by its exquisite mosaics, and also because no copy can do justice to the refinement and softness of the outlines of its dome. No description of plinths or arches, nor comparison, — for the world has nothing remotely like it, — can give any idea of the spell and beauty of the Taj. It must be seen to be appreciated, and those who look upon it never grasp, until afterwards, the beauty of the design, the skill displayed by the workmen, or the splendour of the materials of which it is constructed. 'You see it with the heart, before the eyes have time to gaze

There is a secret fascination which cannot be explained. It seems to appeal most to the fancy and has an individuality of loveliness, a peculiar beauty, an indefinable tinge of evanescence, which seems to remove it far from the category of ordinary architectural works.

The plans and estimates for the tomb were prepared by a Venetian, who was ordered to furnish an estimate for a building to cost 30 000,000 Rupees. At his death, the work was made over to a Byzantine Turk, and the French artist, Austin, was consulted about it. The collection of the materials, the marbles and the sandstone and the jewels, which came, as the poet says 'by toiling men and straining cattle over a thousand wastes and a thousand hills,' and the building of the tomb, says

Tavernier in his Travels took twenty two years the last inscription on the building being 1648, and this monstrous edifice was the forced labour of no less than 20 000 workmen for that long period

The Chinese Wall.

The Great Wall called *H'an le chang* (i. e. the myriad mile wall) by the Chinese was built by Tsin Chi hwangh about B. C. 213 in order to protect his dominions from the incursions of the northern tribes. It is sufficient evidence of the solidity of its original construction that it has remained so well preserved in a region of frost and moisture. It commences its course at Shanhaiwei (lat. $40^{\circ} 4' N$ long. $120^{\circ} E$) which is a place of considerable trade, the gate here is called *Shanhai Kwan* or the Hill sea barrier. Lord Jocelyn describes it when observed from the ships as scaling the precipices and topping the craggy hills of the country which have along this coast a most desolate appearance. It runs along the shore for several miles and terminates on the beach near a long reef. Its course from this point is west a little northerly along the frontiers of the province of Chihli and then in Shensi, till it strikes the Yellow River. This is the best built part and contains the most important gates where garrisons and trading marts are established.

Within the province of Chihli there are two walls inclosing a good part of the basin of the Hoangho the inner wall having been built by one of the emperors of the Ming dynasty. From the point where it strikes



FIG 12

CHINESE WALL

the Yellow River it forms the northern boundary of Shensi, till it touches that stream again, in lat 37° N. Its direction from this is north-west along the northern frontier of Kansuh to its termination near Kiayukwan.

From near the eastern extremity of the wall in the province of Chihh, extending in a north easterly direction is a wooden stockade, or palisade, which forms the boundary between Liautung and Kirin, and has often been taken, from its representations on maps, as a continuation of the Great Wall. It was erected by the Manchus, and garrisons are placed at the twelve gates, through which the roads pass, leading from the Shung king into Mongolia.

The entire length of the Great Wall including all its doublings, is estimated by McCulloch at 1,250 miles. The construction of this gigantic work is somewhat adapted to the nature of the country it traverses. In the western part of its course, it is less substantially built than in the eastern, being in some places merely a mud or gravel wall, and in others earth cased with brickwork. The eastern part is generally composed of a mound of earth and pebbles, faced with masonry, supported on a coping of stone, the whole being about twenty-five feet thick at the base, fifteen at the top, and varying from fifteen to thirty feet in height; the top is terraced with tiles, and defended by a slight parapet, the thinness of which has been taken as a proof that cannons were unknown when it was erected.

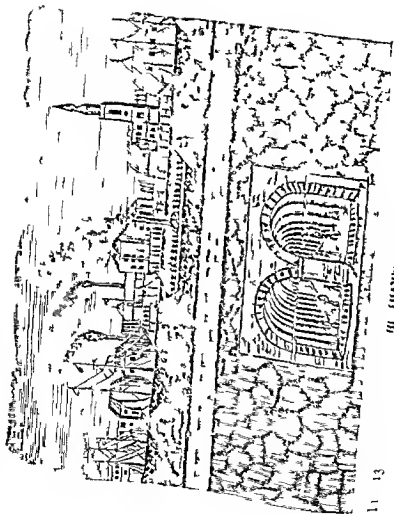
There are brick-towers upon it at different intervals, some of them more than forty feet high, but the usual

height is a little under that elevation. They are not built upon the wall, but are independent structures, usually about forty feet square at the base, diminishing to thirty at the top, and at particular spots the towers are of two storeys, nearly fifty feet in height.

This remarkable structure did, no doubt in some degree, serve as a barrier against the incursions of the nomadic tribes near it for many ages after its erection, though it is plain from the facts of history that it availed but little against the attacks of their enterprising chieftains. At present it is simply a geographical boundary and except at the passes, nothing is done to keep it in repair.

The Thames Tunnel.

The process of making a more or less horizontal underground passage or tunnel, without removing the top soil is known as tunnelling. In former times any long tube like passage, however constructed, was called a tunnel. At the present day the word is sometimes popularly applied to any underground passage. Tunnelling has been effected by natural forces to a far greater extent than by man, and the very fact that there were so many examples of natural caves and tunnels in existence is the reason why tunnelling was one of the earliest works undertaken by man, first for dwellings and tombs, then for quarrying and mining, and finally for water supply, drainage, and other requirements of civilization. The processes by which such works were carried on were rather crude and



tedious, but gradually the introduction of gunpowder and by those appliances which science and civilization brought in their train considerable practical advance was made in this direction. We shall confine ourselves here to a short description of the famous sub-aqueous tunnel of the Thames, which being the first work in that direction carries with it a good deal of interest and admiration.

The Thames is the most important river in Great Britain. The total length of the river, taking into account the various branches into which it divides and sub-divides itself is 228 miles, and it drains an area of 600 miles. It affords about one half of the water supply of London, and is the principal outlet for its sewage. The scenery through which it passes, though scarcely to be called picturesque, and in a certain sense monotonous, has a peculiar charm for the richness of its sylvan beauty and its pleasant alteration of hill and dale. The number of islands, that occur in the course of the river, adds to its interest and affords convenient seclusion for the erection of boat houses and tents, and is much in request with pleasure-seekers for boat racing and holiday making.

From a very long time endeavours were being made to construct near London a tunnel as a means of crossing the Thames on foot. Some one tried to construct a tunnel on a very grand scale but this passage having been blocked up with masses of sand, he had to leave off his great work unaccomplished. At last in 1825, with the permission of and with an offer of pecuniary assistance from the Parliament, Sir I. Mark Brunnel entered

upon the construction of the great tunnel and finished the work in 1843

First of all at a considerable distance from the bank of the stream he constructed a brickwork ring, 16 yards in circumference, and 14 yards in height, on a foundation of 1 yard in breadth. He tightly framed it with planks and ironbars and placed it in the ground after removing the earth surrounding it. Inside this he constructed a series of steps and then placed a water pump worked by steam.

The water that accumulated in it by trickling down from its sides, was pumped out and thrown into the river. After the construction of the tunnel door, the work of tunnelling began. At first there appeared no difficulty in making the underground passage, as the soil was hard. But when it was just below the bed of the river, masses of sand began to crumble down and repeatedly blocked up the passage. The bed of the river too gave way, and water rushed down in torrents. Brunnel however was too intelligent and persevering to succumb to the difficulties he thus met with, and he was not long enough to suggest a means for overcoming them. He filled large numbers of bags with mud and threw them into the river thereby preventing the water to percolate and rush in into the passage. Then he made a sheet of iron so strong as not to be broken by the weight of the river, and had it fixed there with strong screws. The workmen now could easily go on with their work under its cover. After boring for about 6 inches, he removed the sheet of iron slightly onward,

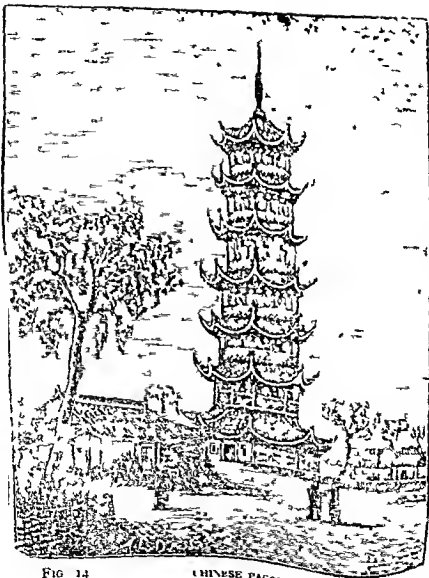


FIG 14

CHINESE PAGODA.

and under its protection, he built very strong arches for its supports. But in spite of the very great precautions used, the arch often broke down and caused immense loss of labour and even of life. Nothing however could damp the spirit of Brunnel, and he succeeded in completing the construction of this monument of British ingenuity and perseverance in the year 1843.

The cost incurred in this gigantic undertaking was estimated at thirteen hundred pounds per lineal yard and the tunnel is now used by the East London Railway.

The Wonderful Chinese Pagoda.

The site of the Pagoda, of which a description is given here is at Nankin the capital of Kianguan district of China. The ancient Chinese regarded this city as the richest and the most beautiful of all the cities in the world. In a description of the extent of this city a story is told that in order to circumscribe it two men on horseback starting before daybreak in opposite directions from one of its gates and riding at full speed could not even meet before evening. Be that as it may, it is evident that the story is exaggerated. But this much is certain that the extent of Nankin is greater in comparison with those of the other great cities.

in China. The circumference of the walls round this city is nearly forty-eight miles.

Nankin is situated at a distance of three miles from the river Yau-tseking, and boats are often plying in the canal which connects the city with the river. The city is not well proportioned nor is it built after any prevalent style owing to the presence of some mountains in it. This city was once the capital of ancient China and was hence called Nankin or the Southern Royal Council. But since the removal of the capital to Peking it has been called King-moo-foo.

In this city there is a beautiful Pagoda made of Chinese glass which excites our admiration. It was built by Hing-moo the thirty-second emperor of the Chew dynasty in 270 B. C. This superb structure though constructed some 2700 years ago has baffled all the attempts of time and neglect—the inevitable destroyers—and still commands the admiration of the world. From the pinnacle down to the base it is made up of pieces of glass which are so tastefully set up that a single glance will convince the visitor of the perfection of art and he cannot but admire and respect the immortal artist. The Pagoda itself is octagonal in form 270 feet high and consists of nine storeys. The second storey can be reached by a flight of forty-four steps. The elegance, beauty, and art displayed in its interior cannot be expressed in words until one visits this magnificent work of human art.

The Temple, The Walls and Hanging Gardens of Babylon.

Babylon, the city of pre historic celebrity and the capital of the Babylonian empire, was, according to some writers, founded by Belus, while others affirm that Semiramis was its founder. The Assyrians after several invasions, succeeded in destroying it about 1271 B C. But Nebuchadnezzar rebuilt it, and made it one of the wonders of the world, by building the Temple of Belus, the walls of the city and the Hanging Gardens in it about 600 B C. The city stood on a large plain in a very fat and deep soil on the river Euphrates at a distance of about fifty miles from Bagdad, and was built in the form of a perfect square. The perimeter of this square was fifty miles.

According to Herodotus, the city was completely surrounded by walls, 87 feet thick 350 feet high, and about 60 miles in circumference. These walls were drawn round the city in the form of a perfect square, each side of which measured fifteen miles and were built of large bricks cemented together by bitumen. These bricks were made of earth dug out of a deep ditch which encompassed the walls. This ditch was full of water and lined with bricks on both sides. In every side of this great square, were twenty five gates, made of solid brass. Each gate was separated from the other by three towers, while there were four more at each corner. Every one of these towers was ten feet higher than the walls.

The Temple of Belus was a huge tower consisting of eight towers, one built over the other. Its height was 600 feet, and it was built in the midst of a circular piece of land about eight miles in circumference and bounded by beautiful artificial lakes, canals, and mountains. In each of the above mentioned towers were many great rooms with arched roofs supported by pillars. There was an observatory on the top of the uppermost tower in which was a chamber expressly consecrated to Belus. Among several statues of massive gold there was one 48 feet high mentioned by Diodorus Siculus, the cost of which amounts to three millions and a half of English money. But the total value of the images was according to Herodotus £21,000,000 sterling.

Nebuchadnezzar, to gratify his wife Amytis, the daughter of the Median king, built the Hanging Gardens in imitation of the Median hills and forests. The gardens were 400 feet square and were carried up to the height of the walls by vast arches, raised one over the other and surrounded by a wall, 2½ feet thick. Large flat stones measuring 16 feet by 4 feet were spread on the top of the arches. A layer of weeds cemented together by bitumen covered the stones and upon it was built a floor made of two rows of bricks. Thick sheets of lead were laid over this floor. On these sheets lay earth which was so deep that large trees might grow in it. The trees planted in it were said to have been of various kinds. These wonderful gardens were watered by pumping machines from the river Euphrates. In the

spaces intervening the arches, were built large and splendid apartments, fountains, and groves.

After several invasions by Cyrus, Darius Hystaspes, and his successors, this great city was plundered and finally destroyed by Xerxes, the king of Persia. Alexander the Great had an idea of fixing his residence in this city, but his untimely death put an end to this project. What remained afterwards was burnt by the Parthians, about 130 B. C.

Statue of Jupiter Olympius

Long before the institution of the Olympic Games which were originally celebrated every fifty-ninth year, by the Greeks, in honour of their supreme god Jupiter Olympius, Olympia was regarded as a sacred spot and boasted of an oracle of Jupiter. The object of these games which were afterwards celebrated every fifth year was to cement the union of the different Grecian States and to give a stimulus to virtue and courage.

Olympia, situated on the river Alpheus near Ellis in Peloponnessus, was the centre of trade, and the Games made it the seat of education, knowledge, and literary compositions. It is but natural that such a spot should be connected with some exquisite colossal statue of the presiding deity, which would unite the opposite qualities of gigantic dimensions with the strictest rule of proportion, so as to produce upon the wondering crowds an impression that they were in the presence of the living

god in the temple. Materials were not wanting, but where was the artist who would give birth to and execute this bold design? Fortunately for the Greeks in the fifth century B. C. the æsthetic school of Greece produced the greatest of their artists in the person of Phidias. Banished from Athens on a false charge of misappropriating the gold and ivory supplied to him for a statue of Minerva and other public works in the time of Pericles this great artist found an asylum in Elis whose people entrusted him with the execution of a costly statue of Jupiter Olympius.

The god was formed of gold and ivory seated on a throne and almost touching the summit of the temple so that it appeared that if he had risen he would have lifted off the roof. His head was crowned by an olive branch, in his right hand he carried a figure of Victory also of gold and ivory holding a wreath and having a crown upon his head. In the left hand of the god was a shining sceptre of varied metals and on the summit of the sceptre was an eagle. The sandals and the robe thrown over the lower part of the body were of gold. Upon this robe were painted figures of various animals and flowers particularly lilies. The throne was composed of a diversified mixture of gold of precious stones of ivory and of ebony exhibiting figures of all kinds, painted and sculptured. We are not told what were the dimensions of the statue but the height of the interior of the temple in which it was placed was sixty English feet.

To encourage the belief of the real presence of the

god in the temple the priest invented some legends one of which was that after the completion of the statue Phidias prayed Jupiter to make himself known by some supernatural sign and immediately the pavement of the temple was struck by lightning and the spot was afterwards marked by a bronze vase. The statue sustained its reputation for four centuries and drew crowds from all parts of Greece and Italy. The effect produced by it upon the minds of the votaries and of all persons, irrespective of caste or creed, was so great that on beholding it they believed that the god had personally descended from heaven to absolve them of their sins. To die without having once seen it was regarded as a calamity throughout Greece and Italy.

slabs of Parionnesian marble that they acted like so many glass mirrors

Here about 350 B. C. in the centre of the square of the city was raised in memory of her deceased royal brother and husband Mausolus a magnificent tomb, that gave the designation to all other buildings that were subsequently erected as tokens of affectionate regard and nuptial love by Artemesia the daughter of Hecatomus the king of Caria. The love which the wife bore to her husband is rarely to be met with on this side of the grave. It was so great that after the dead body of Mausolus having been burnt she used to drink the ashes with wine or other liquor.

The Mausoleum was 11 feet long and 9½ feet broad and was ornamented with a peristyle of thirty six columns each of which was 60 feet high. Above this the structure resembled a pyramid with three terraces. The columns were separated from one another by statues of Parian marble and at each angle of the basement there was a projecting portico on the top of which was a gigantic statue on horse back. The first terrace was similarly decorated with bas reliefs while there was a gate on either side that led to the interior of the tomb. Octagonal towers headed by cones of gigantic height and sculptured in bas relief were to be seen at two angles of the second terrace while the crown of the pyramid rose from the third terrace and on its apex was a marble statue of Phaeton driving in a chariot with four horses. The huge and costly structure was raised on a platform which could be

reached by a flight of steps. It was profusely enriched with ornament in the Grecian style and attained a height of 140 feet. The entire building was of the Doric order.

The cost incurred in completing this grand edifice was so great that the philosopher Anaxagoras, on seeing it, exclaimed, "How much money is changed into stone!" Artemesia did not live to see it finished, but, as Vaux observes, "Such was the emulation of the artists, that they are said to have finished the work after her death for their own honour and the glory of the art; and such it remained, being called for many subsequent centuries one of the seven wonders of the world, and repeatedly mentioned under this designation till a period comparatively modern."

Of this wonderful monument not the smallest vestige has remained to modern times, except some fragments presented to the British Museum by Sir Strafford Canning.

The Pyramids of Egypt.

A pyramid is generally a building of a quadrangular shape, having a broad base. It gradually diminishes towards the top and is generally built of large limestone with its four sides facing the four cardinal points. Buildings like pyramids are found in various countries, but by far the finest specimen are to be found in Egypt.

The origin of these stupendous and eternal monu

ments of human art and labour is completely shrouded in obscurity. Some writers infer from their facing the four cardinal points, that they were built for astronomical observations, while others, finding the sacrophagi within them and the mummy pits and tombs all around trace to their construction a religious motive. On the one hand we are told by writers of repute that they were, like mounds, towers, and monuments that are found scattered all over the world, mere repositories of the illustrious dead on the other hand, according to the Arabian writers, about three hundred years before the Great Flood, the prophecy of the forthcoming Deluge that was made by Achimur, the chief priest of Egypt in interpreting the dream of the king, Saourid Ibn Shallouk, was the occasion for the construction of the pyramids which as the Coptites say bore the following inscription I King Saourid, built the pyramids in such and such a time and finished them in six years he that comes after me, and says that he is equal to me let him destroy them in six hundred years and yet it is known that it is easier to pluck down than to build up I also covered them when I had finished them with satin and let him cover them with mats. But all agree in this that the Egyptians—the builders of the pyramids—must have been a highly civilised people who had practical knowledge of geometrical figures both plane and solid and knew how to carry the heaviest blocks of granite over a distance of nearly 700 miles and to cut and polish them with unparalleled precision and nicety.

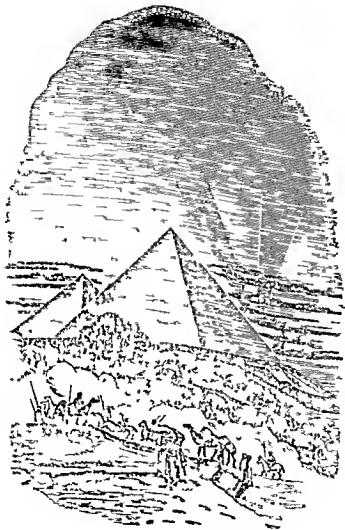


FIG. 1.— THE PYRAMIDS OF EGYPT

Among the Egyptian pyramids, the most remarkable are those of Geezeh. They stand on a rocky plateau elevated about one hundred feet above the plain forming a kind of promontory in the Libyan chain, whose greatest projection is towards the north-east. On this platform are raised three large pyramids. The first of these, known as the great Pyramid, was built by Cheops, a king of Egypt, about 900 B. C. Six millions of tons of stone were used in its construction. Its base occupies an area of 550,000 square feet, and its present height is 474 feet. It is made up of 203 platforms, each smaller than the one on which it rests. The topmost platform is nearly 33 feet square and consists of six square blocks of stone. It is supposed that its original height was 502 feet, and that some nine layers were pulled down. Herodotus tells us that 100,000 men took twenty years to finish it, and that the body of Cheops was placed in a room beneath its bottom. He then observes: "that each face of it measures eight plethra (800 Greek feet), it being quadrangular and the height the same. It is made of polished stones, fitted together with the greatest nicety, none of the stones being less than thirty feet long. The pyramid was built in the following manner, in the form of steps, which some call *crosses* (battlements), and others *basides* (little altars or platforms). When they had built it in this fashion, they raised the remaining stones by machines.....as many tiers of stones as there were, so many machines also there were; but according to another account (for I think it right to give both

accounts as they were given to me), they transferred the same machine it being easily moved, from step to step, as they raised each stone. The highest parts were accordingly finished first, then the parts next to the highest and last of all the parts near the ground, and the very bottom. There is an inscription in Egyptian characters on the pyramid stating how much was spent in furnishing the workmen with leeks onions &c and as I well recollect what the interpreter said who explained the characters to me it was 1,600 talents of silver.

The view from the summit is from association impressive. The internal aspect of this wonderful structure is not less astonishing than its gigantic exterior. Upon the sixteenth step or platform and nearly in the centre of the side which faces the north an entrance is obtained. The greater number of chambers and passages are the most highly finished parts of the work and this accuracy of construction distinguishes the interior. The Queen's chamber is 17 feet long 14 feet high and 17 feet wide above it is another called the King's chamber which is nearly twice the size of the former. In this room stands a sarcophagus of highly polished red granite measuring 7 feet 4 inches by 5 feet. In the middle of this pyramid is a large tank whose depth is 86 cubits.

The second and third pyramids were raised by Cherheron brother of Cheops and Mycerinus the son of Cheops respectively. All these stand in a diagonal line from north east to south west.

Temple of Diana at Ephesus.

Over all the cities in which the celebrated goddess Diana was worshipped Ephesus stood pre eminent. This city, once of historic celebrity was thirty eight miles south south east of Smyrna in Asia Minor. According to Strabo it surpassed all other cities of the world in splendour and glory and was the great emporium of Asia Minor while another describes it as one of the eyes of Asia. But this city where heathenism Christianity and Mahomedanism flourished one after another is now in ruins and contains some unintelligible heaps of stones and untenanted mud cottages while the sea as if to avoid the contagion of malaria which rages here all the year round has receded to a distance of several miles leaving a pestilential morass covered with mud and rushes. Part of it is now under cultivation and silence and desolation reign supreme over this once resounding theatre of the world where first the heathens and after their conversion the Christians built magnificent temples which evoked the admiration of ten thousand souls who proclaimed to the world Great is Diana of the Ephesians and Great is the Lord Jesus. Verily in the prophetic language of inspiration the candlestick is removed from its place a curse seems to have fallen upon it men shun it not a human being is to be seen among its ruins and Ephesus in faded glory and fallen grandeur is given up to birds and beasts of prey a monument and a warning to nations.

According to the Grecian mythology the city was founded by Ephesus, the son of Cresus, while tradition points out the Amazons, to be its founders who, being pursued by Hercules were said to have taken refuge in an altar erected to Diana for the protection of the helpless. A third and a more trustworthy account comes from the pen of Strabo who takes it to be the first settlement of the Carians and Leleges—a people of the islands on the coast of Asia Minor. The original object of worship was a small statue of Diana, of ebony, made by one Cnædias, though at that time it was commonly believed to have been sent down from heaven by Jupiter. The first magnificent temple that was erected in the reign of Servius Tullius, about 570 B. C., to contain this statue, is said to have perished in flames.

A second temple begun in 540 B. C. was again partially burnt on the day on which Socrates was poisoned, 400 B. C. It exceeded in splendour all other similar buildings in the world, and Xerxes, the Persian king, who destroyed temples wherever he went, spared this one, for its splendour and magnificence. The temple having been restored to yet greater grandeur, it was set on fire by Cræstratus who, confessed to have done this sacrilege merely to immortalise his name, on the birth night of Alexander the Great, 356 B. C. The Ephesians declined to accept the offer of Alexander who proposed to rebuild it on condition of being allowed to put his name in the front. In this third fire the roof only was destroyed, and the materials

saved from it were sold. With this money and the immense treasure obtained by the sale of jewels and other valuables cheerfully offered by the women, and other liberal contributions sent from all parts of Asia, the temple was restored to its former magnificence. This temple which was completed in 220 B. C. stood between the city and the port, and was built at the base of a mountain and at the head of a marsh. From the fragments and columns now among the ruins it may be inferred that the building was of the composite order and not of the Ionic order. The choice of site naturally necessitated the construction of vast drains to convey the water of the mountain into the morass and river. In this work only the stone that was used was obtained by exhausting the quarries of the surrounding country. Phny tells us, that to secure the foundations of the conduits and sewers, which were to support the weight of this gigantic structure, there were laid first well rammed beds of charcoal and secondly layers of wool.

In Kitto's description we find, it was 425 feet in length, 220 broad, and supported by 127 columns, each of which had been contributed by some prince, and was 60 feet high, 36 of them were richly carved. Chersiphron, the architect, presided over the undertaking, and, being ready to lay violent hands on himself, in consequence of his difficulties, was restrained by the command of the goddess, who appeared to him during the night, assuring him that she herself had accomplished that which had brought him to despair. The

altar was the work of Phrygians. Costly and magnificent offerings of various kinds were made to the goddess and treasured in the temple such as paintings statues &c. the value of which almost exceeded computation. The fame of the temple, of the goddess and of the city itself was spread not only through Asia but the world a celebrity which was enhanced and diffused the more readily because sacred games were practised there which called competitors and spectators from every country. Among his other enormities Nero is said to have despoiled the temple of Diana of much of its treasure. It continued to conciliate no small portion of respect till it was finally burnt by the Goths in the reign of Gallienus.

The Colossus of Rhodes.

Colossus in antiquity is a term applied generally to statues of great size and in particular to the bronze statue of Apollo in Rhodes which on account of its extraordinary dimensions came to be reckoned among the seven Wonders of the World.

The island of the Rhodes is one of the most important among the Greek dependencies and obtained an influence over the manners and customs of modern nations which few portions of that intellectual country failed to exercise and which many of them have maintained to the present day.



FIG. 16.

THE COLOSSUS OF RHODES.

The harbour of Rhodes possessed many natural advantages, having a basin particularly well enclosed within the horns of the crescent that embraced it, nearly meeting each other. Upon each of these a mole of solid masonry was constructed, with little more than room for a galley of the first class to pass through. Not content, however, with these solid advantages, the vanity of the Rhodians required some distinguishing attribute to symbolize the importance of the capital of their island, or, which is probably a reason nearer to the right one, to serve as a mark by which the entrance to the harbour might be perceived by those who were out at sea.

The design adopted was a colossal figure of Apollo, and Charles, a disciple of Lysippus and a native of Lindus—one of the chief cities of the island, was the artist chosen to execute the work. Lysippus himself was a celebrated sculptor, but no works of his pupil were left except the *Colossus*, as it is commonly termed, to attest his merit. This alone, however, was sufficient to intimate him to have been a man of genius profoundly acquainted with his art, and it became, soon after its erection, celebrated for the skill with which it was modelled, as well as for the magnitude of its proportions. By what means it was cast we are not informed, and indeed our knowledge of the mechanical process is, among the ancients, on every point, very confined; but we know that twelve years were expended in constructing the statue before it was considered fit for its site. It was made of brass of very valuable quality, and by means

of which, we are as ignorant as we are of the mode of its conformation, it was fixed in its place with a foot resting on each of the moles that fenced the harbour. The height to which it was raised was seventy cubits or 105 feet with an elevation between the limbs that would allow a ship in full sail to pass beneath without lowering her masts. The figure was completed and placed in its proper situation about three hundred years before the Christian era, and for fifty six or eighty eight years (which term is the correct one cannot now be ascertained) it remained perfect and entire. The majesty of its imposing presence continued during that period unimpaired by a single defect and the shadow of its lofty stature was thrown in a lengthened and far reaching form over the curling wavelets of the Egean deep giving to the startled mind of the simple mariner the impression of the supernatural presence of the god whose figure stood high in the stainless air where not a vapour nor a cloud intervened to mix the beauty of the scene or impair the effect of the principal adjunct it contained. A winding staircase ran to the top where by the aid of glasses which hung round the neck of the figure ships sailing along the coasts of Egypt or Syria could easily be discerned.

After the period of which we have spoken in the year 334 B.C. the statue was partly demolished by an earthquake and fell into ruin in which state it continued for 874 years and during that time it remained without an effort to repair it. But the Greek people

who justly considered this figure of Appollo one of the glories of their country, made a public collection in order that it might be restored to its primitive grandeur, and the inhabitants of Rhodes gladly received the proposition. The money was subscribed, but under various pretexts the application of it to the purposes for which it was intended was deferred from time to time until at length the parties who had received the amount perceiving that the matter lay in abeyance, appropriated the treasure to their own use, and boldly informed the Grecian deputies that the oracle at Delphi had intimated that it was the will of the god that the statue should not be repaired. The parties who were thus shamefully abused appear not to have had either the power or inclination to enforce their desires for the money was never returned, and the statue remained a ruin until its final destruction several centuries afterwards.

Having been subjected with the whole of the Hellenic empire to the Roman yoke, the island of Rhodes remained for a long period a dependency of that power until its control was broken up and its existence in the east as well as in the west under its several phases of Latin and Greek denomination, became a nonentity when it was made a fief of their own by the ardent and aspiring Saracens. By that intellectual and comparatively well informed people, year 672, they took down and sold the remains of this splendid statue to a Jewish merchant of Tdessa for 100

enormous, but, considering the worth of the statue insufficient sum of £36,000. By him the metal of which it was composed was removed, and it is said that he was able to load as many as nine hundred camels with the brass, which was 720,000 lbs weight. After this first degradation, Rhodes seems never to have recovered its importance, but gradually decayed, and though not a very convenient entrepot for some of the commerce of the Levant, it is otherwise but little regarded in the world, and has again returned to much of the quietude of its original tranquility.

WONDERS OF THE WORLD.

PART II

SEA.



FIG. 17.

THE MERMAID.

to happen. Thus in the Greek mythology two mermaids disclosed to Hagen his future course. According to Resenius a mermaid appeared to a peasant of Samœ foretold the birth of a prince and moralized on the evils of intemperance. (B) A mermaid imparted supernatural powers to a human being. Thus in the beautiful story of the Old Man of Cury reported by Hunt's Popular Romances of the West of Ireland the old man instead of silver and gold obtained the power of doing good to his neighbours by breaking the spells of witchcraft chasing away diseases and discovering thieves. A ship-master, named John Reid had also his three wishes fulfilled by a mermaid so that neither he nor any of his friends would perish by the sea that he would be uninterruptedly successful in everything he might undertake and that the lady who scorned his love would scorn it no more. (C) A mermaid has some one under her protection and for wrong done to her would exact a terrible penalty. One of the best examples of this is the story of the Mermaid's Vengeance in Mr Hunt's book. (D) A mermaid falls in love with a human being lives with him for some time and his lawful wife and then some compact being unwittingly or intentionally broken by him departs to her true home in the sea. (E) A mermaid falls in love with a man and entices him to go and live with her below the sea or a merman wins the affection or captures the person of an earth born woman. This form of romance is very common and has naturally been a favourite one with poets.

In relation to man, the mermaid is usually of evil issue if not of evil intent. She has generally to be bribed or compelled to utter her prophecy or bestow her gifts and whether as wife or paramour, she brings disaster in her train. In itself her sea life is often represented as one of endless delights but at other times a mournful mystery and sadness brood over it. The fish tail which in popular fancy forms the characteristic feature of the mermaid is really of secondary importance, for the true Teutonic mermaid is described in the recognised article of *Karl Blind — New Finds in Shetlandie and Welsh Folklore* — had no fish tail. As represented in signboards and coats of arms of the English heralds the creature is given a single tail, while the French and the German heralds ascribe to her a double one.

Historical or quasi historical instances of the appearance or capture of mermaids are common enough and serve to show at any rate how the myth had taken hold of the popular imagination. A mermaid captured at Bangor on the shores of Belfast Lough in the sixth century, was not only baptised but admitted into some old calendars as a saint under the name of *Morgen*. Stowe in his *Annals* relates how a man fish was caught on the shores of England in or about the year 1187 A.D. and was kept for six months and more in the castle of Oxforde in Suffolk. In 1811 two little mermaids were found to be basking on the shores of the Isle of Man by three travellers who were out as birds nesting and grouse shooting. Their attention was

drawn to these by a sort of carole,—a lamentable moan, resembling the mewling of a wild cat. On looking for the source whence the noise proceeded, they came to this spot where both of these were lying. A closer observation disclosed to them the fact that one of these wonderful creatures was dead, and the other was apparently mourning over the loss. They somehow got the living one entrapped and brought both of them home. For some time they served to be a profitable show. They were about 4 feet long had hairs about 5 inches in length, with scales and fins of a reddish hue. The cavity of the mouth was small but there were no teeth. The one that was alive was found to be rather fond of herrings and lobsters. It is not known how or when it ceased to live, or what became of it afterwards.

In 1610 Captain Richard Whitburne observed a mermaid in St. John's harbour, and his attention was drawn to it by the long deep black hairs on her head, but she dived down before she could be approached.

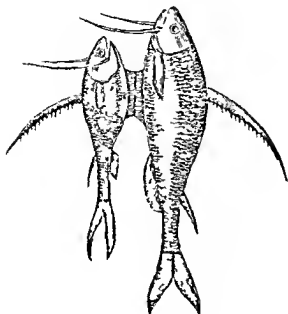


Fig 18

THE DOUBLE-FISH.

for the earliest authority who has spoken of her has described her as a woman and some distinguished antiquarian said that she was not a fish because she could spin and that she was not a woman because she could live in the sea, and thus it is perhaps that in course of time she got herself fully established as a genuine mermaid.

The Double Fish.

It is impossible to conceive the varieties of fish that Almighty Providence in the infinitude of its designs has created and made to inhabit this terrestrial globe. To those that delight in the study of creation fishes embody a world of wisdom of incalculable significance. Apart from the varieties that come within the scope of scientific study there are some which have been regarded as abnormal specimens of wonderful construction and the description given below relates to one of them.

In 1858 Mr Salmon an Englishman while sailing on the river Carolina in America observed two fishes joined together near the stomach. The figure above shows with moderate exactness the form they presented. With considerable difficulty he succeeded in immobiling it by means of a net and brought it home still alive. It is said it did not live long in its new home.

The Flying Fish

Most of us have from our infancy cherished the idea that fishes live in water and die when exposed to the air. This however is a superstition which like so many false and baseless superstitions clings fast to our mind and does not admit of a thorough examination into its truth or otherwise. We shall describe here a class of fish which not only can live in the air but also command the power of flying about even as birds.

The flying fish has a fat belly and a long body. It has large blue eyes. The upper part of its body is of light grey while the part below the abdomen is perfectly colourless. The fins are somewhat long and in some cases extend beyond the tip of its tail. The peculiar shape and length of its fins enables it to swim awfully fast and also to fly about in the air as swiftly as little birds. It rises high up in the air as far as a bullet can reach and then it is a pleasure to see it fluttering or racing about in a frolicsome spirit. When exhausted it at once drops down and dives deep into its watery home. The abode of this wonderful fish is the Mediterranean Sea.

Water Falls

In large and perfectly developed rivers the course is divided into three parts. As the water flows from a high to a lower level, the upper part of the course

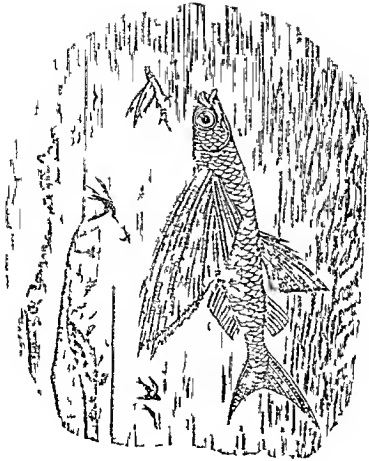


FIG. 1

THE LIVING FISH

must evidently flow at a level higher than that at the lower part. This circumstance combined with the degree of slope which, on an average is by far the greatest near the source, leads naturally to the conclusion that waterfalls are the constant attendants of the upper courses of rivers, and so it is. But they are also met with in the middle part of the course where, indeed, they are, as a rule grander and richer in volume.

The falls of Stubbach, in the valley of Lauterbrunn, rushes down from a height of 280 yards, the Marbre near Giverny, in the Pyrennes, is twice as high. Both however are surpassed by the falls of the Rhine near Schaffhausen, where the mass of water plunges over a precipitous wall of rock, 120 yards wide and 2½ yards high. But what is it in comparison to the Falls of the Niagara or the Victoria Falls on the Zambesi?

The Niagara is a river in North America forming a portion of the great lake and river system known as the St. Lawrence. The name Niagara ("thunder of waters") is the invention of the Indian tribe who adopted it to characterise its remarkable flow of waters and the phenomenon accompanying it. It flows northward from Lake Erie at a height of 573 feet about sea level to Lake Ontario, and within 33 miles of its course makes a total descent of 328 feet. On issuing from Lake Erie the river is only about three fourth of a mile broad, and for the first two miles is somewhat swift; it then divides and passing round Grand Island broadens and assumes the tranquility of a lake until the com-

mencement of the rapids where it suddenly narrows and makes a descent of about 57 feet in a mile before its hurried and troubled waters are precipitated over a lofty chasm forming falls of unexampled grandeur. The breadth of the river immediately before making the leap is 4750 feet but the centre is occupied by Goat Island rising about 40 feet above the water and occupying a breadth about 1000 feet. A distance of about 1400 feet separates it from the American side and about double the distance from the Canadian side while the length of the verge line between the island and the Canadian side is increased by an inward horse shoe curve. The height of the fall on the American side is about 164 the discharge is about 18000000 cubic feet per minute. The waters plunge into an abyss about 1000 feet wide and during the next seven miles make a descent of about 104 feet through a deep ravine with perpendicular banks rising to a height from 200 to 350 feet the breadth of the river varying from 50 to 400 yards. Three miles below the great falls the whirlpool rapids are formed by a sudden turn in the channel causing the waters to impinge against the Canadian shore and then to rush back to the American side in a great whirl or eddy. The river is crossed by a suspension bridge for foot passenger about 250 yard below the falls and a mile and a half further down by two railway bridges about a hundred yard apart—one of which has a carriage way eighteen feet below the other a cantilever bridge completed in December 1885 carries a double line of rails. The Niagara Falls are

the most famous of the earth's waterfalls, and are visited by crowds of admiring spectators. According to an approximate reckoning, about a thousand million cubic feet of water is dashed down the precipice every day, and the thunder of the falling mass can be heard ten miles away.

But the Victoria Falls on the Zambesi surpass those of the Niagara itself in grandeur and beauty. The magnificent river one thousand yards wide pours its waters into a rocky chasm 300 feet below, which cuts across its bed at right angles, and is bounded by rocks sixty feet apart. As the water comes nearer to the Falls, it rushes towards them with giddy speed and the long lines of foam upon its surface give it the appearance of being at boiling heat. Near the western shore is a little island about 120 feet from the bank where the water with a mighty roar and whirl, arches over like a wave of the sea, and plunges to the depths below. Travellers who are proof against attacks of dizziness can stand here upon a ledge of rock which overhangs the western side and see to the left close beside them the Falls just described. The long line of the principal Falls in front, is of course only partially in sight, for the air pressed down, contracted, and filled with watery particles, frees itself with a violent effort and rises in spectral masses of steam and vapour, which rest like incense clouds above the mighty altar of the waters. The spectator standing on this point of rock and looking steadily down into the whirling, forming, hissing chaos at his feet, wrapped round by the din and

fury of the raging elements, is thrilled to his inmost heart by the weird, unearthly, indescribable howl and roar which seeks to stun and deafen him, and wonders how the rocks themselves,—those hard ribs of solid earth—can resist the fury of the on-set. After the /impose has forced its masses of water through the narrow pass 100 feet in width it rolls on in three or four snake like curves. In the narrow river bed the depth of the water must be enormous. The sides are formed by perpendicular walls of rock 500 or 600 feet high, and absolutely inaccessible.

Water Spouts

Whirlwinds, waterspouts, dust storms, and tornadoes as we have said before, are essentially the same, differing from each other only in their dimensions, their intensity, or the degree in which moisture is condensed into visible vapour.

Waterspouts are formed by the foam of the sea being sucked by the aerial eddy and then ascending with a whirling movement. A black cloud covers the sky, from which a projection is let down in the form of an inverted cone, and continues to increase and extend downwards. The sea immediately beneath is soon thrown into a violent agitation, showing that the whirling movement which began in the clouds has extended to the sea, and is doubtless continuous throughout, though the portion of the column from the apparent apex of

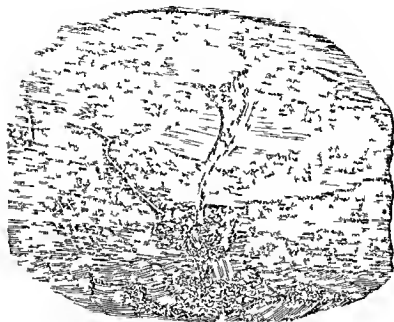


FIG 20

WATER SPOTS

the cone to the surface of the sea does not seem so on account of the vapour being condensed into cloud. As the whirling movement of the column becomes more intensely developed, the increased rapidity of the gyrations brings about increased rarefaction of the air within, with the inevitable result of increased condensation of the vapour into cloud downward. Under each of such columns the surface of the sea is seen to be more or less heaped up, as if in violent agitation, showing that the atmospheric pressure immediately under the gyrating columns is less than it is all round.

The disastrous effects of waterspouts are often extremely serious. It is said that ships threatened by a waterspout have succeeded in destroying with cannon this moving column of vapours, but if it is of large dimensions, the passing of a ball can only have a slight effect, and as it is generally accompanied by a tempest, vessels can hardly escape from its grasp.

Geyzers or Thermal Springs.

In certain volcanic districts, such as Iceland, Java, New Zealand, and near the upper Yellowstone in Missouri, among the Rocky Mountains of North America, are found hot springs, from which the water rises at intervals high into the air, with great violence accompanied by thick clouds of steam and loud roaring noise. The best known of this kind of springs are those found in Iceland among which the Great Geyser holds the first rank. Its name comes from an Icelandic word *gjos a*, to boil or, as it has been rendered by some writers, bubbling or *tempestuous*. At any rate, it is now applied to the whole class of thermal springs. In Iceland itself the hot springs are called *Hverjar*, and the inhabitants distinguish between those whose water is always in a constant state of ebullition and those which are sometimes at rest, during which time their water is not so hot, and which only throw up boiling streams at intervals. The latter are the intermittent springs, of which we are about to speak. Springs which never reach boiling point and whose waters are in a constant state of quiescence, are called by the Icelanders *laug*, or warm bath. The area in which the Icelandic hot springs are situated is not of any great extent, it is situated to the South west of Hecla, in a plain at the foot of the Byornafell, which adjoins a rocky chain of porous stone. The traveller is warned from afar of his approach to the geysers, by the light vapour clouds floating round him. The exterior of the Great Geyser presents the appearance of a low mound, about



FIG. 1

GEYSERS OR THERMAL SPRINGS

seventy-six and a half yards in diameter and eleven in height. It consists of horizontal layers of silicious *débris*, which have been thrown up by the water from time to time, and fallen into its present position. On the top of this mound is a flat basin, about eighteen and a half yards in diameter, in the midst of which a pipe, about four and a half yards in diameter, is sunk vertically into the earth, to a depth of twenty-seven yards. Through this pipe the hot water rises.

The temperature of the water in the basin stands at about 176° Fahr. At intervals of eighty or ninety minutes the subterranean thunder gives the warning signal for an eruption. The waters in the basin rise and swell, and masses of vapour drive them into the air, to a height of about five and a half or even nine yards. The first column is soon followed by a second and a third, each higher than the one preceding it. Short pauses occur between each eruption, until at last, frequently after the lapse of twenty four or thirty hours a magnificent spectacle is presented. Terrible rolls of thunder from below announce the crisis, the waters of the basin swirl and rise, sending up immense gusts of steam and vapour, until suddenly, with the rapidity of a flash of lightening, a mighty shaft of water shoots like a rocket in one unbroken stream, veiled in clouds of steam, to an enormous height. From time to time small jets of water break off sideways, and fall over in arched curves, the close white masses of steam sometimes veiling, sometimes revealing the waters within. This grand sight occasionally lasts for ten minutes.

when the great column sinks and disappears without a trace. While the boiling streams are still pouring down the flinty mud the inner basin is left dry and even in the centre pipe the water does not reach to within more than a few yards of the top and its surface is as quiet as that of any ordinary well.

Several smaller thermal springs in the neighbourhood present considerable attractions to the visitor by their curious and interesting phenomena. The so-called Little Geysir is situated in a separate group of hot springs about thirty six miles away from the Great Geysir. Its eruptions take place on an average at intervals of about three hours and a quarter. They are preceded by an increased development of smoke and a splashing noise underground. Then comes a rush of boiling foam rising and falling at intervals ascending higher each time until in about ten minutes when the crisis of the scene occurs it sends up sheer like columns of steam and water to the height of thirty or forty feet. The feathery streams then decrease as gradually as they rose and in another ten minutes the geyser has regained its usual state of repose.

The district of these hot springs extends for about a mile on both sides of the Waikato southward to the foot of the steep rocky slope Whakapiripatirangi and northward to the wooded mountain Tutukanui. Most of the springs lie upon the right bank of the river, which is very difficult of access as the river cannot be crossed near the springs but only above or below them and then the traveller has to clamber along the steep

projections of rock overgrown with brushwood which overhangs the shore, and where one is by no means sure of not sinking at any moment into some treacherous pit of boiling mud.

Of the numberless geysers which pervade this extensive district, mention is often made in travellers' accounts of the Great Geyser, the Little Geyser, the Tetarata Geyser, the Tetakapo Geyser, the Upper Yellowstorn Geyser, the Thumping Geyser, the Fountain Geyser, the Fan Geyser, the Pyramid Geyser, and a few others. We quote below an account of some distinguished travellers who visited this locality —

"Soon after our arrival," the report continues, "we witnessed a magnificent spectacle. A low thunder roll was heard beneath our feet, the earth trembled in every direction, and suddenly from a crater near the river-side a column of steam shot high into the air. It was followed in a succession of sudden shocks by a jet of water apparently six feet in circumference, which rose to a height of two hundred feet, while the stream towered above it to more than one thousand feet. It would be difficult to describe our excitement during the development of this phenomenon; if we had been several days in the place, and in some measure prepared for the sight, it might have been possible to watch in silent admiration the wonderful grace and beauty of the mighty column as it rose to the giddy height above during a space of twenty minutes. After the eruption the water sinks a few inches in the basin, and the temperature falls to 149° Fahr."

None of the geysers in the valley seemed to us to equal the Great Geyser, whose crystal waters pour forth from two openings. For ten feet round we found masses of silicious earth varying from a few inches to three feet in height. They look like spongy corals; the bottom of the basin is covered with similar decoration and the margin is most daintily adorned with pearly fringes. Outside the basin are several small reservoirs each surrounded by its delicate white border. They are filled with transparent water and are from one and a half to three feet wide, many being triangular in shape. As the water slowly filters through the evaporation forms broad shallow basins tinted with the most delicate colours by the deposits which sometimes take the form of sponges and every one of the countless little channels delights the eye with its charm of colouring. The great opening appears to boil up about every twenty minutes, and to send up the whole mass of water from ten to fifteen feet high into the air but although both the openings are within the same enclosure, we could not be certain that there was the slightest connection between them. When the larger opening is in commotion the Great Geyser shows no signs of agitation both seem to work entirely independent, one of the other. The Great Geyser sent up two bursts of water during our stay, at an interval of thirty two hours, it is not regular in its eruptions and can only be accurately described by observations extending over several days.

The Pharos at Alexandria.

The building of watch towers, now called light-houses, had its rise in the earliest ages ; and in several instances has been the object of royal munificence. The purpose of their erection is to exhibit a light, to warn seamen during the darkness of the night, of their approach to any sand, promontory, or insulated rock , as those on the South Foreland, Flamborough Head, the Eddystone rocks, etc.

The most celebrated structure of the kind among the ancients was the Pharos of Alexandria, which has been accounted as one of the seven wonders of the world. This famous tower was built by the Ptolemies, kings of Egypt, and successors of Alexander , it is supposed to have been finished about 283 years before the Christian era, and had the name of Pharos, from the island, upon a rock at the eastern end of which it was built, so that its walls were washed by the sea. Its height is said to have been 547 feet, (English measure,) and a fire upon the top of it was constantly kept burning in the night, to light such ships as sailed near these dangerous coasts, which are said to be full of sands and shelves of rocks. This light could be seen from a distance of forty two miles.

This magnificent structure called even by Cæsar wonderful, was the work of Sostratus, of Cnidus. And from the accounts which have descended to us of its great size the durability of its materials, and of the substantial manner in which it was built, we might have

reasonably expected it to be in existence at this day, but this is not the case, there is, indeed, still a light house but of a much more humble form, rising out of the midst of an irregular castle, or garrison kept in this island, and it is now called Pharos. The ground floor and the two next above it were hexagonal, the fourth was a square with a round tower at each angle, the fifth floor was circular and continued to the top to which a winding staircase conducted. In the upper galleries some mirrors were arranged in such a manner as to show the ships and objects at sea for some considerable distance. On the top a fire was constantly kept, to direct sailors into the bay, which was dangerous and difficult of access.

The whole of this masterpiece of art was exquisitely wrought in stone, and adorned with columns balustrades, and ornaments worked in the finest marble. To protect the structure from the ocean storms it was surrounded entirely by a sea wall. Ancient writers say, the building of this tower cost 800 talents which is equivalent to £165,000 if Attic talents, but if Alexandrian double that sum.

The building was not completed during the reign of the first Ptolemy, but was finished in the reign of his son Ptolemy. Upon what occasion this famous building was destroyed, or met its destruction history is as far as we know, silent, but a writer of the twelfth century speaks of it, not only as a building subsisting in his time, but in perfect good condition for he says There is nothing like it in the whole world, for the fineness

of the edifice, or the strength of its structure ; it is built of the hardest Tiburtine stones, and these stones are also joined together with melted lead, and so firmly connected, that they can not be loosened from one another ; for the sea beats against the very stones where-with it is built on the north side."

As this stupendous work existed, either entire or in part, about five hundred years ago, it is evident that some extraordinary fate must have happened to it since that time ; as its disappearance cannot be accounted for merely by the neglect of it. To have pulled it down would have been a work of so much labour, that even a wanton desire of destruction would have been foiled in the attempt . and it appears scarcely possible that its demolition could answer any useful purpose. Nor can we suppose that it has been undermined by the sea gaining upon the rocks it was built upon, as those are said to be of granite. It seems therefore most likely, that it was destroyed by the shock of an earthquake, which at the same time produced a subsidence ; as it has been stated by travellers, that the foundations or ruins of art are still seen among the rocks of the island on which it stood, under the surface of the water. At any rate, we have authentic testimony that this stupendous tower subsisted for a period of one thousand six hundred years.

WONDERS OF THE WORLD.

PART III

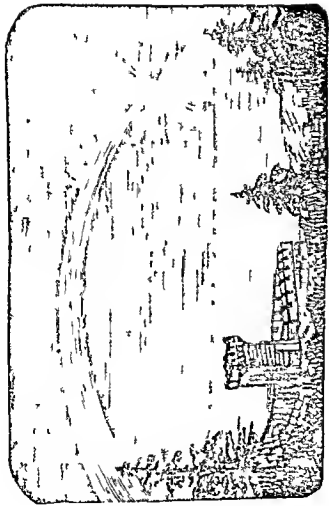
SKY.

WONDERS OF THE WORLD.

PART III.

SKY.

NITEONS AND SHOOTING STARS





Meteors and Shooting Stars.

The term meteor is usually applied to those bodies which, as globes of fire, are occasionally seen darting through the heavens at unknown distances from the earth and in undetermined paths. They sometimes explode and project upon the earth fragments of stone called meteoric iron from which it would appear that they are solid bodies in a state of intense heat and are then known as aerolites or meteorolites.

These meteors have often been noticed in the following manner —A small dark cloud is observed to be suddenly formed in a perfectly clear sky, and soon after to ignite, taking the form of a fiery ball, which darts with immense rapidity through the skies, followed by a long train of flame and smoke. Sometimes a dreadful explosion takes place, when a shower of stone falls upon the earth. Of the fireballs that pass across the heavens, and sometimes explode and disappear, leaving no trace of their solid materials, many instances have been recorded. They appear singly at regular intervals.

move with great rapidity, exhibiting sometimes a brilliancy more dazzling than the sun at noon day. A luminous train sometimes follows them, and their path has been known to remain brilliant for several minutes after they have disappeared. They send forth vivid scintillations, and present various bright colours. The same meteor is differently described as seen from different places. Often they divide into two or more bodies which keep along together, and sometimes explode with a report like thunder. They appear at no particular season, and are limited to no particular portions of the earth, though most of the observations have been recorded in Europe.

The meteoric stones or aerolites which have fallen on the earth at various times are amongst the most interesting of mineral substances. In their case alone are the erratic boulders of another world submitted to our view, though we can not say with certainty whence they came or how they were formed. Although frequent mention of many such having fallen occurs in the works of the ancient writers, where they are reputed as being of celestial origin, and has having divine honours paid to them, till within the last century they were treated as fabulous by all the learned in Europe. An aerolite which fell at Yorkshire in 1795, was found to weigh fifty six pounds, and general attention was then turned to its study and gradually all doubts were removed as to the extraterrestrial origin of the aerolites.

The following instance of the fall of an aerolite is recorded by M. Flammarion — On the 7th September

1868, at half past ten in the morning, in the arrondissement of Manleon in the Lower Pyrennes, the sky was suddenly illuminated by a meteor, which looked like a burning ball with a long train of fire in its track. It emitted a bright light of pale greenish hue, and lasted for six or ten seconds. Its disappearance was preceded by an explosion and by the simultaneous projection of flaming fragments, while there remained for sometime after, a light and whitish cloud. This was followed by a continuous noise like the distant rolling of thunder, and then by three or four detonations of extreme violence, which were heard at points distant fifty miles from one another. Immediately after these detonations a hissing noise was heard like that made by a red hot iron while it is plunged into water, then a dull sound indicating the fall of a solid body to the ground. The mass had fallen at about thirty yards from the church of Singuis-Saint Etienne, in the bed of a small stream and was shattered into fragments, the largest of which scarcely measured two inches long. The fall was witnessed by two men, who were talking together, and who, terrified at the detonations and hissing noise, had thrown themselves upon the ground just as the stone fell about twenty paces before them. The weight of the stone was estimated at from six to eight pounds.

Many theories have been thrown out as to their origin. By some they are supposed to have been projected from the huge volcanoes of the moon. It is more probable however that there exist myriads of small bodies in the planetary regions, which circulate

round the sun principally in zones. Of these some may be entirely consumed when shooting through the air with planetary velocity, merely revealing their existence by the luminous track which precedes their extinction, or else are deflected so near the earth as to become luminous in a part while still retaining their own independent orbits.

Not less interesting and grand is the phenomenon of the shower of stars. A planter of South America thus describes the effect of the scene on the ignorant blacks :—"I was suddenly awakened by the most distressing cries that ever fell on my ears. Shrieks of horror and cries for mercy I could hear from most of the negroes of three plantations amounting in all to about six or eight hundred. While earnestly listening for the cause, I heard a faint voice near the door calling my name. I arose, and taking my sword, stood at the door. I heard at this moment the same voice beseeching me to rise and saying, "Oh ' My God, the world is on fire ! I then opened the door : and it is difficult to say which excited me most,—the awfulness of the scene or the distressing cries of the negroes. Upwards of one hundred lay prostrate on the ground,—some speechless and some with the bitterest cries, but with their hands raised imploring God to save them and the world. The scene was truly awful ; for never did rain fall much thicker than the meteors fell towards the earth ;—east, west, north and south, it was the same.

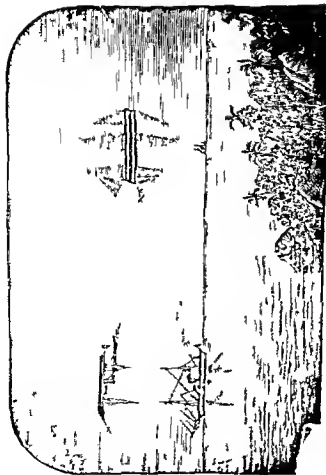


FIG. 11

LATA MORGANA

Fata Morgana.

Some phenomena caused by certain conditions of the atmosphere are of much beauty. Of these the mirage is one of the most interesting that can be witnessed. It is a spectral illusion produced by unequal refraction in the various strata of air, being different in temperature and moisture, by which the light is reflected and re-reflected, giving rise to a blending of the rays. By this means the strangest pictures are produced, sometimes of so extraordinary a nature as to resemble the effects of magic.

The commonest cause of mirage is when the air on the surface of the earth becomes heated directly from the ground, it thus becomes lighter than the stratum of air above it. When the reflection of an object in the upper and denser stratum falls at an obtuse angle on the lower and rarer medium, instead of passing into it, it is again reflected into the denser medium, the common surface of the two strata acting as a mirror. Thus, a person standing on a slight eminence, being at the same time in the denser medium, might see a distant cloud in the heavens, and also the reflection of it, as it were, lying on the surface of the earth bearing a strong resemblance to a sheet of water. The mirage may also be lateral as well as vertical, arising from the unequal density of two continuous vertical bodies of air.

Among the most interesting atmospheric phenomena of the mirage is the Fata Morgana, seen from the midst

of a sea of sand or water. Especially in the desert is the *sehrab* as the Arabs call the mirage an unwelcome sight. The traveller fancies that he sees in the distance blue lakes overshadowed by tall, waving palm trees, but on his nearer approach the vision fades away. In the Nubian desert the phenomenon is seen more frequently in the north and eastern regions than in the other parts of the desert. Burckhardt relates that during a whole day's journey he was encircled by mirage lakes on every side. Their colour was a deep intense blue and so vivid that it reflected the shadows of the mountains round the horizon with the greatest accuracy. This is the ordinary type of the Fata Morgana but the phenomenon appears under other forms which are less frequently mentioned. When the sun's rays are reflected with great intensity from the sand all objects on the desert plain are magnified and appear considerably larger than they really are. A stunted shrub with scarcely a trace of shadow beneath its parcelled and shrivelled branches appears to the traveller as a noble tree able to shelter him beneath its shade. Sandy mounds look like high and distant mountains and in a few minutes the camels have reached them and their true insignificance is revealed. DeSacyrac mentions another form of mirage. Near to the horizon a camel of great size is seen, the head touches the line of sight and the creature itself is in an inverted position with its four legs in the air. By degrees the size gradually lessens dwindling every moment until at length it appears only as a black spot. The

camel has then crossed the horizon, and regained its true size and position, scarcely visible at first, it becomes gradually larger as it approaches the spectator. It has been well-known ever since the French expedition into Egypt, and the researches of Mango, that all these phenomena are caused by an extraordinary refraction of rays of light in the overheated strata of air near the ground. Travellers not familiar with the sight are easily deceived, but the camel, with its keen scent, is rarely mistaken. At times a real lake is mistaken for a play of the mirage, until the thirsty camel scenting the water from afar, quickens his steps in its direction.

Beautiful and curious aerial mirages have been observed by Captain Scoresby, in his expedition in the Greenland waters. "One day in the year 1822, he writes, "I saw, clearly traced against the cloudless sky, the image of a ship upside down, the real vessel was not in sight, not having as yet appeared above the horizon. I had often seen similar phenomena, but the peculiarity of the present one was the extreme clearness of the image, in spite of the great distance of the ship which it represented. It was so sharply defined, that, as I examined it with my telescope, I could distinguish every sail and the peculiar build of the ship so distinctly as to be able to recognise it as my father's. We found out afterwards, upon comparing our ship's reckoning, that we were nearly thirty nautical miles apart at the time, the reflected ship being about seventeen miles beyond the horizon, and several miles beyond the range of vision."

The mirage is frequently witnessed on the southern coast of England. Dr Vince, on the 6th August 1806, at 7 P M saw from Ramsgate at which place usually only the tops of its towers are visible the whole of Dover castle appearing as if lifted up and placed bodily on the near side of the intervening hill. A very fine mirage was observed at Dover in May 1868. The cupola of the cathedral and Napoleon's column at Boulogne were plainly seen from Crescent Walk by the naked eye. Through an eye glass of ordinary power 'says Hartwig' the entrance of the harbour its light house its ships and the surrounding buildings were distinctly visible as well as towards the west of the chief outlines of the coast the light house of Cape Grisnez and a great number of villages and farms with their windows illuminated by the setting sun. While observing all these objects a locomotive was seen to leave Boulogne and to move along with its clouds of steam in the direction of Calais. Soon after sunset the wonderful illusion vanished most probably not to reappear until after the lapse of many years.



FIG. 24 THE SPECTRE OF THE BROCKEN

The Spectre of the Brocken

One of the most interesting spectacles is the reflection of gigantic images seen at the tops of high mountains, on seas, or on the mists arising from the valleys at their bases or on their surfaces. The phenomenon known under the name of the Spectre of the Brocken is one of these, and was first noticed on the Hartz mountains. This spectre, it must be understood, is nothing more than the shadows of men or other objects thrown upon the misty horizon by the light of the sunset or that of the rising moon.

One of the most curious instances of this was observed in December 1826 when a similar circumstance excited some consternation among the parishioners of Mique, in the neighbourhood of Poitiers in France. They were engaged in the exercises of the jubilee which preceded the festival of Christmas, and about 300 persons from the surrounding parishes assembled. At 5 o'clock in the evening when one of the clergy was addressing the multitude, and reminding them of the cross which appeared in the sky to Constantine and his army suddenly a similar cross 140 feet long and of a bright silver colour tinged with red, and perfectly well defined, appeared in the heavens before the porch of the church, about 200 feet above the horizon. Such was the effect of the vision, that the people immediately threw themselves upon their knees, and united together in one of their canticles. The fact was that a large wooden cross, twenty five feet high, had

been erected beside the church as a part of the ceremony, the figure of which was formed in the air, and reflected back to the eyes of the spectators retain exactly the same shape and proportions, but changed in position and dilated in size.

A similar phenomenon met the eyes of some travelers on the Behring Strait, when the sun was diving down the western horizon, and the shades of evening were falling upon the vast expanse of water around. A beautiful figure of a lady dressed in white was seen slowly rising in the sky above. The figure gained in brightness as the darkness shaded deeper till at last it grew into the perfect form of a lady, emitting rays of light. Nothing can paint, no words can do justice to the beauty, the magnificence, and the heavenliness of the image that stood in their front, and astonished, bewildered, and stupefied they knelt down in inexpressible admiration at the sight of this angel of light that seemed to hail them from the clouds above.

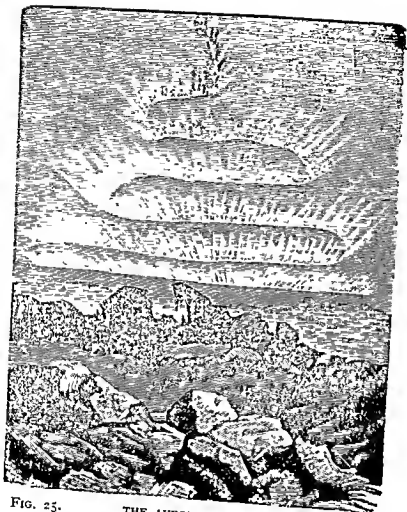


FIG. 25.

THE AURORA BOREALIS.

The Aurora Borealis.

The Aurora Borealis is perhaps the most beautiful of all the various atmospherical phenomena. It is witnessed in all its grandeur in the Arctic regions. The name of 'Northern Lights' by which it is often designated is hardly correct as the same displays are witnessed in the Antarctic regions. In Scotland the Shetland Isles, Scandinavia, and North America fine auroras are witnessed but more extensive exhibitions are seen in Lapland, the shores of Hudson Bay, and the polar islands.

The auroras are the results of atmospheric electricity. According to the researches of M. Becquerel it is probable that the upper strata of atmosphere are almost always charged with positive electricity, while the warmer strata reposing on the surface of the land and of the sea contain the opposite kind of electricity. The aurora is a gentle and gradual recombination of the negative fluid of the earth with the positive fluid of the atmosphere taking place at aerial heights. In tropical regions violent thunderstorms accompanied by abundant rains tend to restore the equilibrium but away from the tropical zone the silent action of the auroras causes the two electricities to meet and become neutralized. This disengagement of electricity in a vast sheet is only visible at night, and assumes every imaginable kind of shape according to the way it takes place and to the perspective caused by the distance of the observer. At times, they are simple diffused gleams

or luminous patches at others, quivering rays of pure
 te which run across the sky starting from the
 horizon as if an invisible pencil were being drawn over
 the celestial vault at times they stop in their course
 the complete rays do not reach the zenith but the
 auroras continue at some other point, bouquets of rays
 dart forth spread out into fans then become pale and
 die out At other times long golden draperies float
 above the head of the spectator and take a thousand
 folds and undulations as if agitated by wind They
 appear to be but at a slight elevation in the atmosphere,
 and it seems strange that the rustling of the folds as
 they double back on each other is not audible Generally a
 luminous bow is seen in the north a black
 segment separates it from the horizon its dark
 colour forming a contrast with the pure white or bright
 red of the bow which darts forth the rays extends be-
 comes divided and soon presents the appearance of a
 luminous fan which fills the northern sky and mounts
 nearly to the zenith where the rays unite in forming a
 crown which in its turn darts forth luminous jets in all
 directions The sky then looks like a cupola of fire
 the blue the green the yellow the red and the white
 vibrate in the palpitating rays of the aurora But this
 brilliant spectacle lasts only a few minutes The crown
 first ceases to emit luminous jets and then gradually
 dies out, a diffuse light fills the sky here and there a
 few luminous patches resembling light clouds open and
 close with an incredible rapidity like a heart that is
 beating fast They soon get pale in their turn every

thing fades away and becomes confused, the aurora seems to be in its death throes. The stars, which its light has obscured, shine with a renewed brightness and the long polar night, sombre and profound again assumes its sway over the icy solitude of earth and ocean.

This description portrays the appearance of the ordinary northern lights of the arctic seas, but there are other special forms of the phenomenon seen in the northern latitudes. We give here an excellent description from an appreciative pen —

All day long the sky has been crossed by bands of light of every possible shape and degree of intensity. It is eight o'clock in the evening—the hour of the greatest vividness for the northern lights. For a while only isolated sheaves of rays are seen above us and yonder in the south a faint almost imperceptible band resting upon the horizon. All at once it rises rapidly and spreads out eastward and westward. The waves of light begin their tremulous play and upward flashes dart towards the north. For a short time it remains stationary and then breaks out into sudden life. The waves of light dart from east to west, the edges assume brilliant red and green colours and dart up and down. The fiery rays flash faster and faster as they come nearer to the magnetic pole. Quicker and quicker the chase continues wave gunning on wave crossing and overleaping each other in the wild rush to be first at the goal. No longer in isolated rays but in sheaves and clusters of flames they fly upward along the southern sky. Now they reach

the point to which they are hastening and one and all are scattered far and wide north south east and west. Are the rays rising or falling? Who can tell? They are all of three colours red white and green a central sea of quivering flame with darting rays reaching to the horizon the whole heavens are on fire. The band has changed to an arch spanning the pole and resting on the horizon it changes to a stormy river of flame where the fiery current rushes from side to side with dizzy speed. Nature is exhibiting such a display of fireworks as transcends the boldest flight of imagination. It seems impossible that these flashes and streams should rise and burst without sound. We listen for the crash of an explosion and are met by perfect stillness absolute soundless silence. The ice is clearly outlined by the light every point and jag is brought into sharp relief and the distant line of the horizon shows black against the white frozen plain. The peaks cast shadows on the surface. The smallest print can be read with ease. But this is only for a time as the whole pageant fades as rapidly as it has come. Only along the northern horizon stretches a band over which the dim light waves flicker. The ice is veiled again in night and darkness. No word can describe no brush can paint the splendour and beauty of the sight.

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Babu G C Mukerjee's *Student's Guide to English Grammar and Composition* is an excellent production of its kind. His list of words with appropriate Prepositions is an elaborate one. No doubt it will help the beginners very much. The latter part is more beautifully got up and speaks much upon the choice of the writer. I am sure this little work will remove the long felt want of the students in passing their University examinations.

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13th August 1898. The Deogizee